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JUNE 1951

BUSINESS · ENGINEERING · INDUSTRY

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as its consumer goods go down
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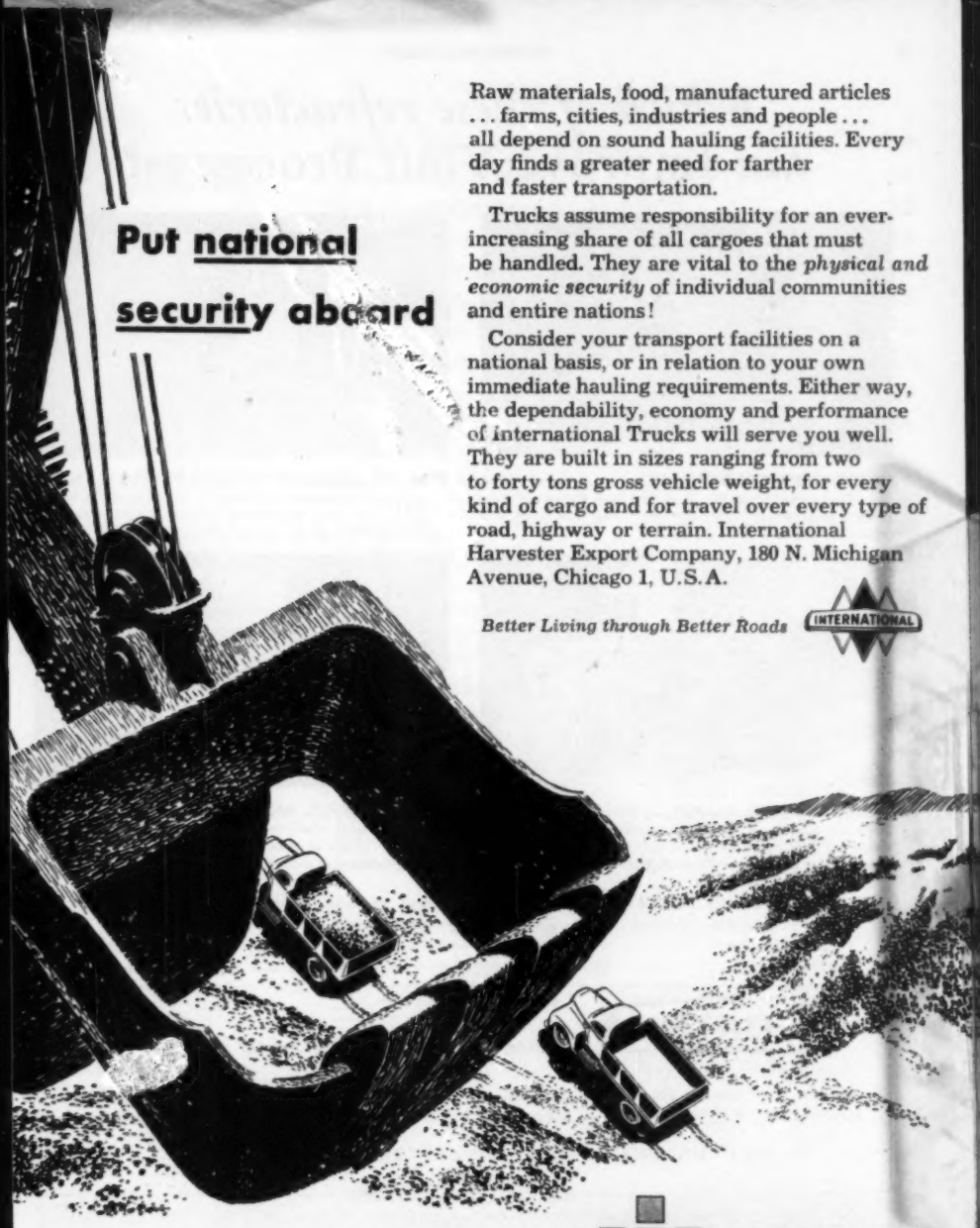

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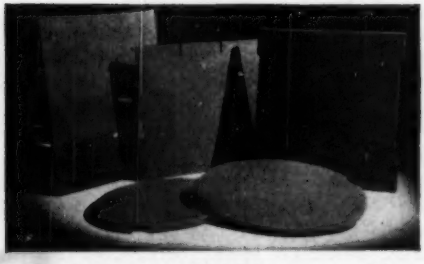

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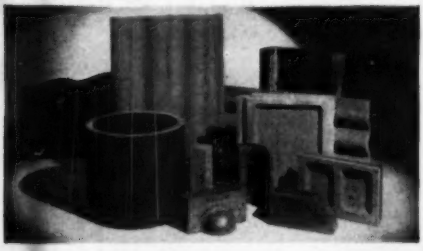

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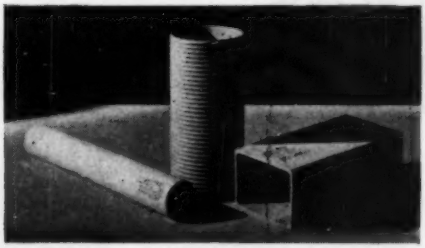

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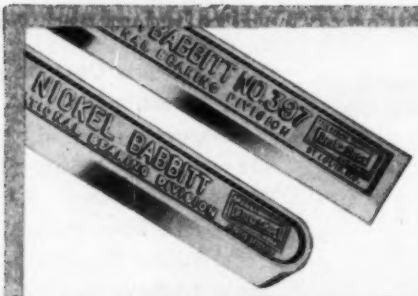

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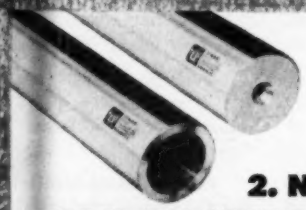

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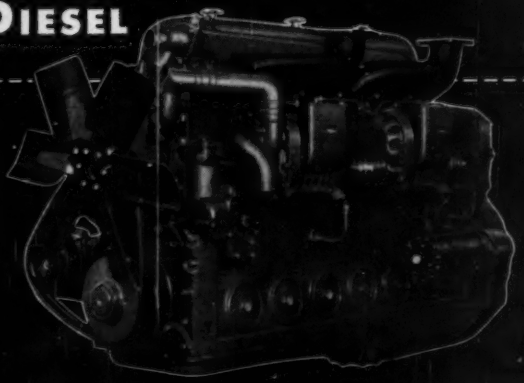

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WRITE FOR BULLETIN S49-5 FOR A MORE DETAILED DISCUSSION OF GEAR TOOTH CROWNING

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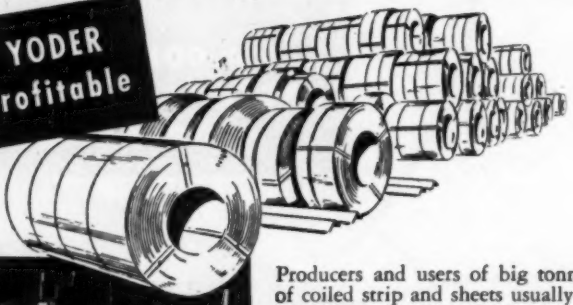

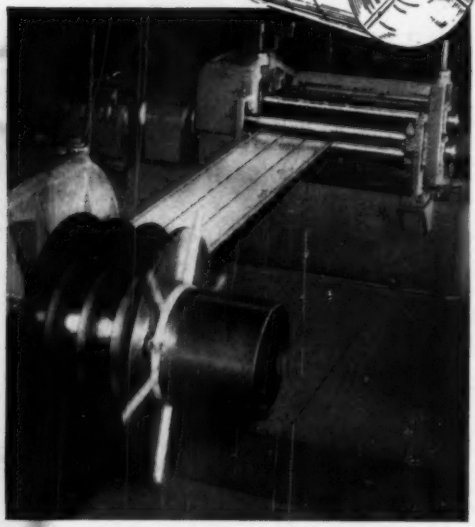

Producers and users of big tonnages of coiled strip and sheets usually find a Yoder slitting line will pay for itself every three or four months. Fabricating shops using moderate tonnages often find the slitter pays for itself in a year or less, operating only one or two days per week.

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BUSINESS TRENDS

U. S. INFLATION PACE has slowed to a walk. But the lull is only temporary. Inflationary pressures will get a big boost this fall and winter. The rapid post-Korea rise in wholesale prices—16% in 7 months—dropped off to 0.5% increase for the next 2½ months. After an 9-month rise of 8%, the index of consumers' prices almost leveled off in March and April.

High production helped hold inflation down—by giving consumers plenty to buy with their rising incomes. Industry has produced more durable goods than anyone thought possible. Output of television sets, for instance, ran at an annual rate of about 8-million in the first quarter.

Meanwhile, the government has run a surplus. With the 1951 fiscal year 10 months old, the surplus was still over $4-billion. But the biggest part of the surplus came in the first quarter. Starting with April, the government began to spend more than it took in through taxes.

Present conditions should last into early summer. Look for a slow rise in prices of manufactured goods because of allowances for increased costs. Wholesale prices and prices of raw materials may even decline a little.

All this is expected to change—abruptly—in the fall and winter. Then, rising military spending, a big government deficit, and inadequate supplies of goods for consumers will send prices upward again.

Spending for defense will jump in the fall, reach an annual rate of about $50-billion by year's end. So far the government has spent little for defense. Military orders for equipment, facilities, and supplies had passed $26-billion by the end of April, but few orders had been filled.

Greater defense spending will mean a large deficit. The U. S. is already running a small deficit. Military expenditures will boost it to an annual rate of $10- to $12-billion by end of 1951; by mid-1952—$14-billion.

Consumers will get less goods as the military monopolizes output of durables industries. With the deficit pumping out extra buying power, inflation pressure will be vastly increased this fall and winter.

Government will try to contain the inflation—with more taxes, stronger controls. President Truman has asked for $10-billion in new taxes, and price officials are using the lull in inflation to get controls in working order.

But taxes and controls, as now planned, will only slow inflation, not stop it. Congress balks at a big tax increase, will probably give only $6- to $7-billion. And tax legislation will not be passed until this fall.

Controls have already helped ease inflationary pressures. Abnormally high department store sales began to disappear in March, partly because of consumer

BUSINESS TRENDS (Continued)

credit controls. Finally, in March, controls on mortgage credit pushed housing starts below record 1950 levels. And price and wage controls, loose though they are, probably had some effect in holding prices down.

Price and wage controls will be stronger and better enforced by fall. But industrial costs—key to prices—will continue to rise. Price ceilings will be adjusted to allow for higher wages, higher costs of materials.

And wages will be going up: Unions already have shattered the first wage order which limited increases to 10% over January, 1950. Future wage ceilings will last longer, but they will all give way sooner or later.

Officials will try other control devices. Among the possibilities: subsidies for farm prices, subsidies for imports, international agreements on raw materials, new consumer savings drives—perhaps even forced savings.

But inflation will continue—regardless of controls. Pressures will be too great. The outlook now is for a steady rise in U. S. prices of up to 1% a month, starting this fall and running well into 1952.

SUPPLY OF METALS is still the chief production problem for U. S. industry. Importers will take all they can get.

Steel is an example. U. S. ingot capacity is expanding about 20-million tons in 2 years—yet industry cannot get enough steel right now. Some manufacturers say that half the steel they use is imported. The U. S. would import more steel, but Europe is sold far ahead and cannot increase supplies.

Copper is a key defense metal. Defense already takes 12% of supply, will need over 20% by year's end. The U. S. is trying to increase production, here and in other countries (see p13). Congress helps, by removing the 2-cent duty on imports.

Zinc is scarce, with defense taking 15%. But the U. S. is cooperating with other countries, letting Britain take zinc intended for the stockpile.

Lead was in good supply—now it is short. It is being substituted for other, scarcer metals. U. S. cannot increase output much.

Tungsten is scarcest. The U. S. at one time got 4,750,000 lb. of tungsten ore a year from China.

Molybdenum is in short supply. It is used to replace tungsten and columbium, a key metal for jet engines.

Other vital metals in short supply: aluminum, nickel, cobalt, chromium. Output is increasing, especially for aluminum and cobalt. But demand is growing too, as military production builds up. Supplies will not nearly be adequate until late 1952 at the earliest.

Republic is moving a Cliff in Africa and a River in North America

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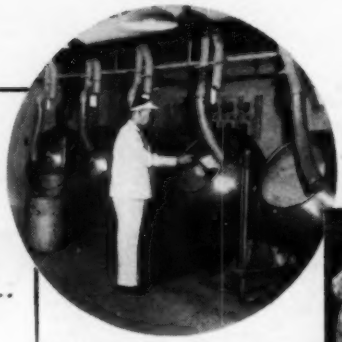
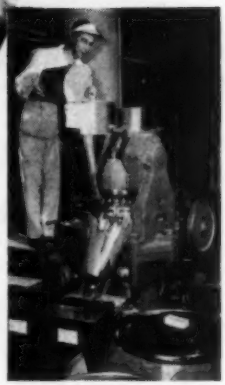


Pharmaceutical Manufacturers... large and small ...rely on Stokes machines. For example, scores of products of the famous Rexall line are made on Stokes equipment in the company's big St. Louis, U.S.A. plant for Rexall stores throughout The States.



Rexall's factory is equipped with many Stokes machines. There are several types of tabletting presses, many coating and polishing pans, mixers, granulators, and machines for filling, closing and sealing tubes. Production cost is low. Quality is high. The speedy Stokes machines meet heavy production demands without failure.

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WASHINGTON REPORT

U. S. FOREIGN POLICY is being challenged by the Congress as never before since the war. This time the administration cannot get through unscathed. You can expect the huge $10.5-billion foreign-aid bill to be pared. You can expect Congress to limit the administration's freedom of action overseas, particularly in Asia.

General MacArthur's dramatic return gave the administration its worst moments. Americans are not used to fighting half-wars. The general's policy, regardless of its merits, presented a formula for getting out of the mess. The administration has failed to do that.

Until the public sees some alternative to carrying the war to China, the issue that MacArthur brought home will remain very much alive. That means it will loom large in the 1952 presidential elections.

A growing distrust of the British is showing up in Congress. The split in the Labor government has brought the issue of Socialism versus rearmament out into the open. To the average Congressman, this issue means simply free false teeth and wigs against more guns to deter Communism. Britain's friends in Washington are sore put to defend them.

CONGRESS WILL VOTE to rearm Western Europe. But there will be cuts elsewhere. And Congress will say more as to how the money will be spent.

Economic development money, where it is not tied directly to strategic materials, is headed for trouble. Administration of Point Four projects is being heavily criticized both inside the administration and in Congress. You got a hint of the mood in Congress when the House of Representatives cut 90% off the Voice of America funds. The legislators do not like the way the State Department is running VOA.

More policy decisions will be made in Congress. Last year, the Senate voted aid to Spain over the administration's protest. This year it will be more aid to Chiang Kai-shek—more emphasis on Asia at the expense of Europe. And if the questions of Formosa's future or Red China's representation in the United Nations come to the fore, you can expect Congress to tell the State Department just what it can and cannot do. That means no deals on Formosa and possibly a U. S. veto over Red China's admission to U. N.

Military strategy—air and sea power versus big armies—will underscore all Congressional debate this summer. That is the essence of the MacArthur issue. That, too, lay behind the Senate's reluctance to vote the troops-for-Europe resolution this spring. The one-time isolationists, like Senators Taft and Wherry, now champion air and sea power at the expense of land power both in Europe and

WASHINGTON REPORT (Continued)

Asia. The idea that U. S. troops must be sent abroad to give our allies the will to rearm and oppose communism has never been accepted by Congress.

HEMISPHERE ECONOMIC PLANNING will have to start all over again if a shooting war comes. Latin American foreign ministers at the Washington meeting this spring went home satisfied for only one reason: The U. S. promised them that shortages of capital goods and essential consumer goods would not be so great as had been expected.

Most Latin American delegates had come to the conferences with proposals to trade their raw materials for specific commitments of U. S. exports. The U. S. could not do that. If real shortages come, the State Department will hear the same proposals renewed and will have to find a better answer.

RAW-MATERIALS DISTRIBUTION is becoming somewhat less of a problem. Washington's long-delayed decision to restore the one third cut in sulfur exports put into effect last January has relieved most of the pressure from abroad on that front. The new price that the U. S. will pay for Chilean copper (27.5 cents a lb.) seems to have satisfied the Chileans.

Tin negotiations are still in the doldrums. Meeting among the major consumers and producers this spring broke up with no results. Consumers agreed that they were in a better position to wait than were the producers. So do not expect the U. S. to back off its current price embargo.

Wool is still a headache. But here nothing can be done before next year's clip. Price stabilizers in Washington have suggested that the President ask Congress to suspend the high tariff on raw wool. But chances are that the White House will consider the move too controversial just now.

Cotton and newsprint still worry foreigners most. Cotton promises to reach a real crisis stage before fall. Washington hopes newsprint can be worked out by a voluntary agreement among U. S. consumers to cut back its use.

INTERNATIONAL GLIMPSES

World Bank and Brazil mapped out a $250-million, 5-year investment program in May. Projects the bank will finance include power, transportation, and chemicals.

Washington hears that U. S. Steel has concluded a contract with Brazil's Companhia do Vale do Rio Doce to buy up half the output of the rich Itabira iron mines.

U. S. has promised to make equipment available to Chile to boost copper output from its current 400,000 tons a year. The Chileans have set a 600,000-ton target. U. S. companies in Chile will get a better tax break.

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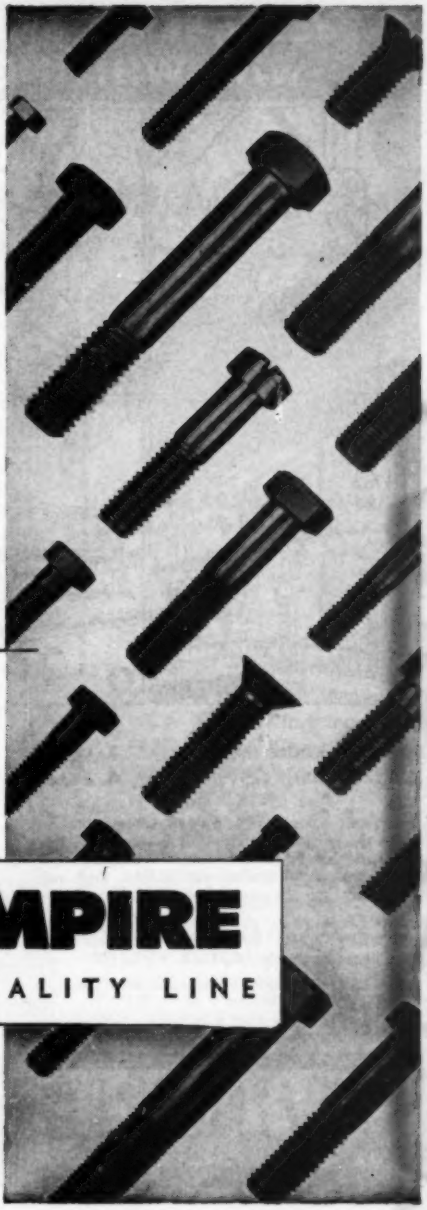

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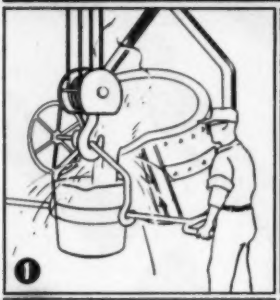

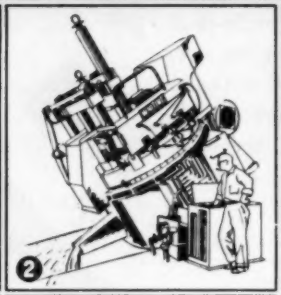

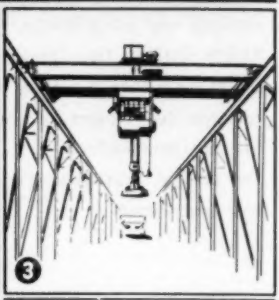

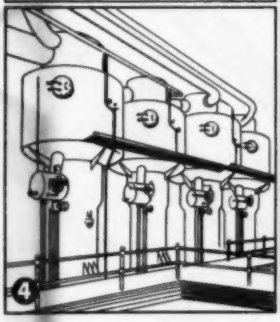

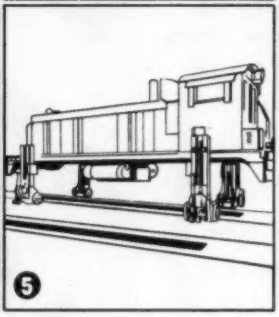

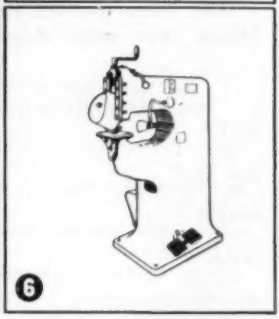

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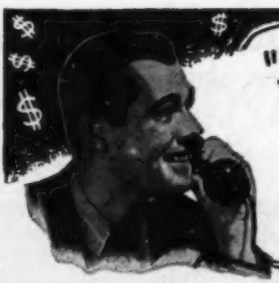

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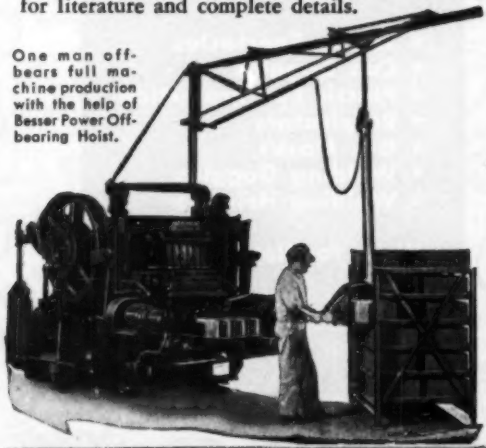

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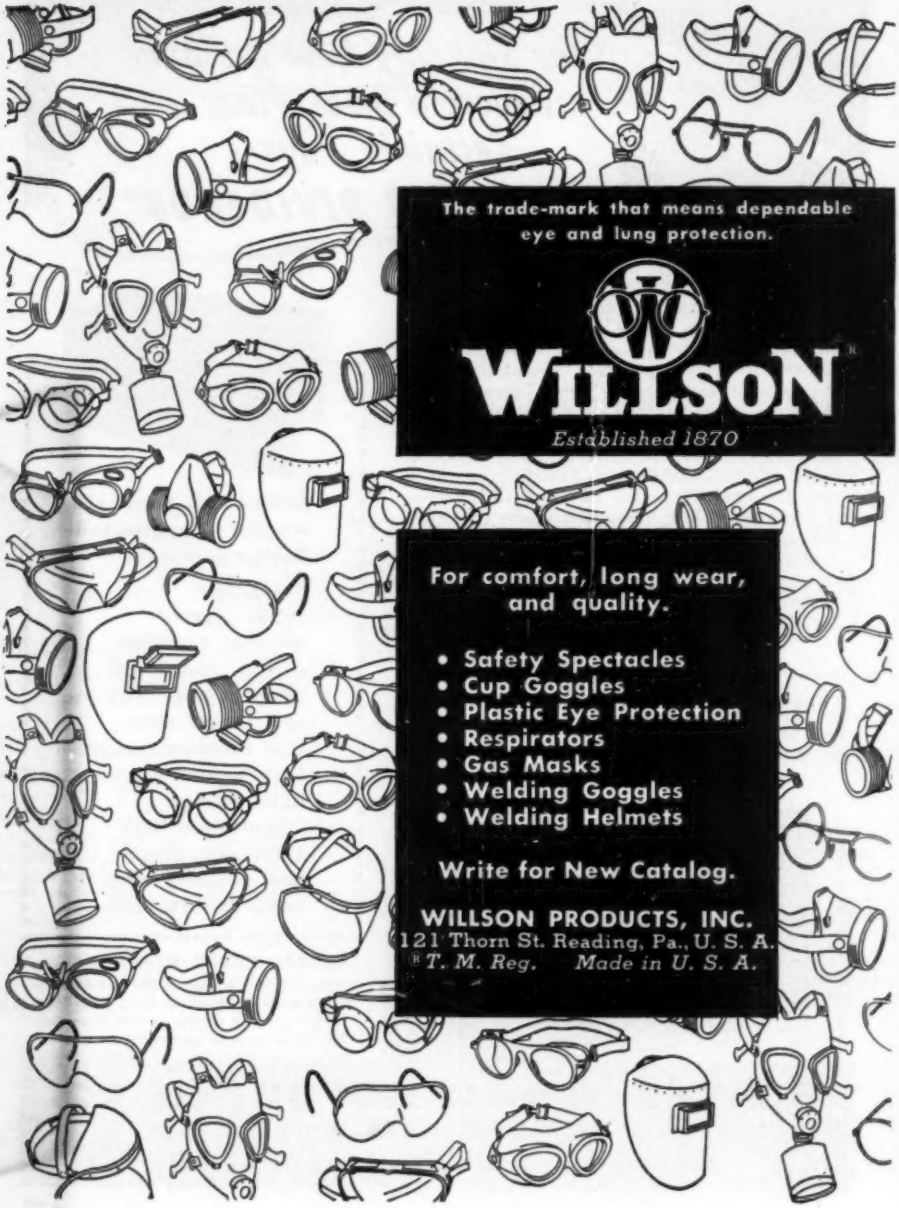
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FACTORIES are speeding up their output, but not in consumer goods. Most production goes into capital goods

FOOD PRODUCTION lags on Russia's farms. Merger of collective farms into larger units has not increased the food supply

Soviet Gains Cost Dearly

Launching of Stalin's fifth Five-Year Plan will find output of steel, coal, oil, electricity up, while food, consumer goods are sacrificed

IF STALIN LAUNCHES his fifth Five-Year Plan, he will be building on an industrial base far stronger than the one he had in 1946 when his fourth plan got under way. In the past 5 years, the U. S. S. R. has made giant strides in repairing the ravages of war and creating a powerful new war industry as well. Russia's output of basic materials is greater today than Nazi Germany's in 1938.

But the priorities given to producer goods since 1945 have been at the expense of both manufactured consumer goods and agriculture. In these sectors of the economy, Russia is worse off today than it was in 1940.

New production behind the Urals accounted for most of the postwar gains in coal, oil, and raw steel. Before the war, the Donbas (Ukraine) and the Moscow Basin produced 100-million tons of coal, or 64% of the total. In 1950 the East (Kuzbas, Kazakhstan, the Urals, and Siberian basins) produced 140-million tons, or better than 50% of the total. Much the same happened to steel. As for oil, production in the Caucasus actually declined by 6-million tons between 1940 and 1950, but output in the East rose 16-million tons, or so the Russians claim.

In 1946 the Russian consumer had been promised an abundance of consumer goods by 1950. But it is obvious, even from official Russian figures, that he did not get them. In fact, the consumer was not even supposed to. The 1950 targets for cotton and woolen fabrics were lower than the goals set (but never reached) for the first three Five-Year Plans.

You can see what has happened in Russia by comparing the capital invested in producing capital goods with the capital put into the manufacture of consumer goods, excluding food. In 1928 the ratio was 2 to 3 in favor of consumer goods. In 1950 the ratio was better than

3.5 to 1 in favor of investment in capital goods.

Russian consumers have benefited somewhat from imports of shoes from Czechoslovakia and textiles from East Germany, Poland, and Czechoslovakia. This probably explains why foreign observers report that the man on the street in Moscow today is far better clothed and shod than he was 3 years ago.

The consumer has gained something, too, from the recent price cuts in Russia. But consumer-goods prices in Russia are still about 50% higher than in 1940, whereas wages have increased only about 25%.

Even in the basic industries, some real weaknesses are showing up. Oil production in 1950 was less than the original 1942 target established before the war. It is impossible to find enough for the growing needs of both Stalin's army and Soviet agriculture.

Despite the doubling of electric power between 1945 and 1950, electricity is still far behind requirements. The production of timber lagged behind the 1950 goal, even though that goal was lower than the target set for the third Five-Year Plan.

By piecing together official Russian reports, plus information seeping through the Iron Curtain, you can also get evidence of shortages in aluminum, rubber, pipe for oil and natural gas lines, rails and locomotives, steel cables, ball bearings, and nonferrous metals.

Russia Faces Food Crisis

On the agricultural front, the Russian economy is hardest pressed. Some Western specialists on Russia have long predicted that the country was heading for a food crisis. Today, the evidence is beginning to bear them out. It is a case of output lagging behind the increase in population. According to European estimates, the 1950 output of animal products was below the 1928 figure.

There is no doubt that the Kremlin takes a serious view of this food problem. Last fall Stalin launched vast new projects for reforestation and irrigation in the Don-Volga region and between the Caspian and Aral Seas. These projects are in answer to real needs as well as to a deep-seated fear of famine.

Farm Control Is Tighter

Why Stalin is pushing ahead with the merger of Russian collective farms into larger units is harder to figure. According to Soviet reports, the total number of collective farms has been cut from 252,000 to 123,000 since the beginning of 1950. And the process is still going on. Probably that accounts for the fact that the 1950 grain crop was no bigger than 1949, although the area sown was larger and 180,000 new tractors were used.

There is an internal propoganda angle, of course. The mergers are supposed ultimately to solve the contrast between country and city life by creating "agrogorods" or agrarian cities, with all modern conveniences.

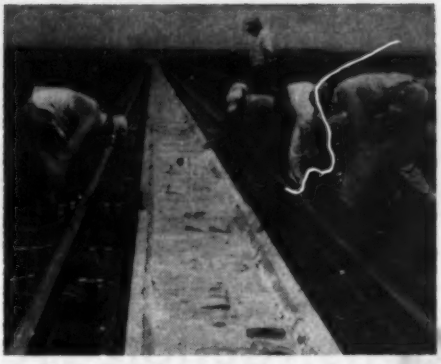
But Western observers refuse to take this seriously. How, for example, is the housing to be built for such a development? Postwar housing in Russian cities has lagged behind official targets, and millions of Soviet workers still live in miserable barracks.

What the Kremlin apparently is after is much tighter control over the collective farms, plus the final liquidation of the small private landholdings. The farmers' work norm is to be raised by putting it on a level with the outstanding farm workers of the whole country.

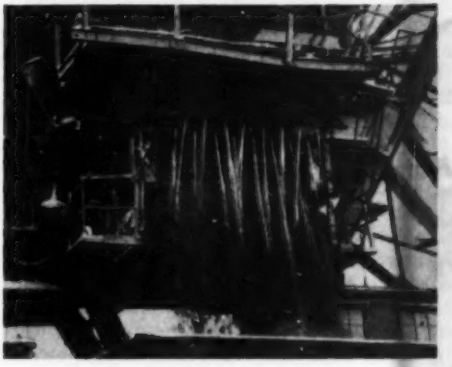
In the end, this reform will probably turn the Soviet peasant into an agrarian slave who will be incapable of any resistance to the state. It is even possible that the Kremlin has ordered this tremendous agricultural transformation as a military defense move. The Kremlin does not forget that in World War II the Soviet Secret police lost control over hundreds and thousands of peasants in the western parts of Russia.—Business Wk, Apr 7, p149

This Month's How To . . .

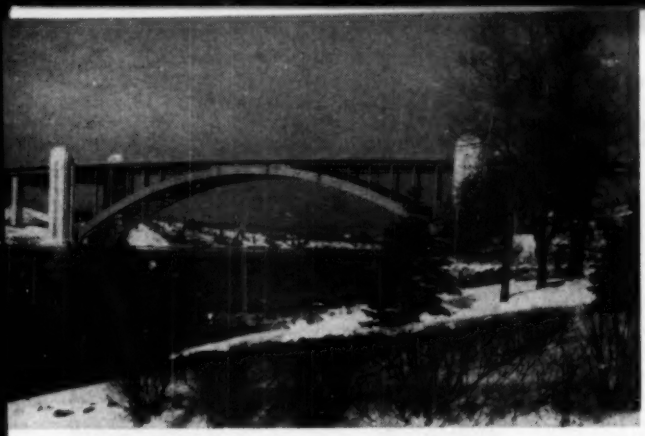
. . . **protect bridge deck** from elements is demonstrated on the Huey P. Long Bridge, La. Originally covered with galvanized steel sheets, the bridge now has an aluminum deck covering. A series of shallow aluminum troughs, laid between the tracks, and a series of elevated plates supported by aluminum "chairs" screwed to the ties, constitute the new deck. One edge of the elevated plates is under the head of the rails and the other overhangs the trough between the rails. Arched plates with edges overhanging the troughs cover the wooden guard rails. —Eng News-Rec, Apr 5, p41



. . . **freezeproof iron ore** with calcium chloride is a quick railroad-car unloading method in cold weather. Erie Railroad first sprays the bottom and sides of each car with a calcium chloride solution. Then the solution is sprayed on each load of ore as it is dumped into the car. Two long solution pipes are mounted across and in front of the hopper on the car side. Outlets in the bottom of the pipes distribute the solution in a uniform spray on each load. One gal. of calcium chloride solution is used per ton shipped. Chloride, 100 lb., is added to every 25 gal. of water.—Eng & Min J, Apr, p103



. . . **speed stock control** is done with an inside-the-plant radio network. When a worker on the Weatherhead Co.'s production line says parts are getting short, the foreman reports the trouble to a radio man who roves the plant with a walkie-talkie. The radio man checks with central radio station. At central station, the order is checked on stock-control charts and relayed to the department where part is made. Finally, another foreman in parts department picks up the radio order and assigns it to a part maker to be filled.—Business Wk, Mar 17, p 96



A STEEL ARCH of 420-ft. span will carry the new by-pass highway around Boston over the Annisquam River at Gloucester, Mass. This bridge is part of 1950's record construction activity

Construction Trends in 1950

THIS EDITORIAL SURVEY brings you some of the outstanding trends and techniques that developed in the construction industry during 1950.

Last year was the largest construction year in U. S. history. Much of the high volume of construction can be credited to the U. S. defense program. But part is in no way related to it, being the result of the country's growth.

Buildings and Housing—Materials and Methods

AN INCREASE APPEARED in the use of panel construction, precast concrete, and lightweight aggregates for concrete and plaster. Also more new office and factory buildings than in any previous year were air conditioned, higher standards of lighting were observed, and more power lines were incorporated.

House construction was speeded up, mainly through more wide-scale adoption of on-site mass-production methods and labor-saving devices.

Many research projects started in 1950. The U. S. Housing and Home Finance Agency (HHFA) is developing a rigid-frame roof to make possible greater utilization of the second floor of a 1½-story house. Another finding is that diagonally applied sheathing can be spaced at 2-ft. intervals.

Currently, HHFA is investigating nonmetallic materials as alternatives for piping, stacks, vents, and drains in household plumbing systems.

Bridge Building—Aluminum, Concrete, Welded Steel

A NEW TYPE of rivet head was developed for gun-driven aluminum rivets on an aluminum Canadian bridge. The rivets have a manufactured "annular" head that is a modification of the usual button type. At the other end of the rivet shank is a hollow hole. In cold driving, a nipple on the rivet snap engages the hole, facilitating spread of the metal to form a head.

Highway departments are swinging to precast concrete for small spans. Precasting is advantageous, considering modern highway loadings, speed of construction, first cost, and maintenance.

The number of welded bridges also con-

tinued to increase steadily. More designers are becoming convinced that, for certain types of bridges, welding has an advantage over riveting in facilitating the work, decreasing ultimate cost of the structure, and conserving steel. Contractors and fabricators are more familiar with welding requirements.

Water Supply, Treatment, and Pollution Abatement

SERIOUS WATER SUPPLY situations developed throughout the U. S. in 1950. Industrialization plus increased population put demand ahead of construction.

New York City has resorted to pumping water from the Hudson River as an emergency measure, pending completion of work on the Delaware River Basin.

A second radical departure made by N. Y. C. was employment of a meteorologist to stimulate precipitation in the area where its reservoirs are located.

Fluoridation of water, as an aid to reducing tooth decay, made headway in 1950. Newburgh and Kingston, N. Y., reached the half-way mark in a 10-yr. study. Newburgh reported its children had 30% less tooth decay than children from Kingston, where fluorides are not added to drinking water.

Pollution abatement on interstate streams is being tackled by point action of the states concerned. The eight member states of the Ohio River Valley Water Sanitation Commission has set up industry-action committees.

River Control, Use, and Dam Construction

RECENT DEVELOPMENTS point to growing interest in the U. S. in the possibilities of providing power to meet peak demands by pumping water from a lower reservoir to a higher reservoir during off hours from whence it can be returned through generators at peak demands.

The Allis-Chalmers Mfg. Co. had under test two units designed to act both as a pump and as a power generator in a pumped-storage plant. Present practice is to have a separate unit for each operation.

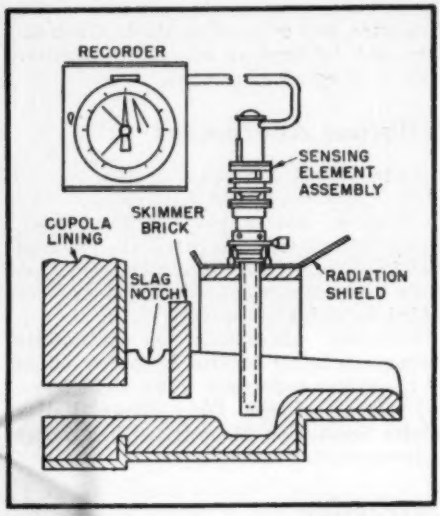
Concrete temperatures for two dams under construction last year were set at a maximum of 50° F. when delivered at the dam. These structures are Detroit Dam, Oregon, and Philpott Dam, Virginia. Because of the 330-ft. base thickness of the Detroit Dam, this low temperature will not eliminate the need for embedded cooling pipes.

Transportation—Highways, Airfields, and Railroads

AN IMPORTANT DEVELOPMENT in road-building was the study of the possible beneficial effect of adding small quantities of rubber to bituminous paving mixes. Rubber apparently improves the homogeneity of the hot mix as it comes from the paver. The rubber reduces the tendency of bituminous surfacing to crack over the joints in old concrete when laid over old pavements.

Military airfields to be built under the defense program are to be tailored to fit the planes that are to use the field. Runway lengths will be specified on the basis of the landing and take-off characteristics of the planes that are to use a particular field.

Fills on the 71-mi. cutoff of the Chicago Burlington & Quincy RR were built according to highway compaction methods. Tops of all fills over 25 ft. high were waterproofed with two applications of asphalt. Before ballast is spread, the top 1½ in. is scarified and 0.7 gal. of asphalt oil per sq. yd. is applied. When it cures to a tacky consistency, an additional 0.5 gal. is applied and the surface rolled.—Eng News-Rec, Mar 29 p91



RECORDS IRON TEMPERATURE

Continuous record of iron temperature at cupola spout is made by unit manufactured by Minneapolis-Honeywell Regulator Co. Sensing element has lens to focus radiant energy from target tube onto a thermopile. Tube is located directly after skimming brick. Radiation shield protects sensing element from heat of slag and molten iron.—Foundry, Apr, p182

New Hear-and-See Telephone

Two unique pieces of equipment developed by U. S. Army Signal Corps Engineering Laboratory are the Video-Phone and the portable teletypewriter. The Video-Phone is an offshoot of closed-circuit television equipment employed to monitor dangerous operations such as test firing of rockets. It works like a telephone, but also shows a televised picture of the person on the other end of the line.

The portable teletypewriter is designed for paratroopers. It weighs only 45 lb. It can operate at 100 words per min. from a tape and is 66% faster than earlier types.—Electronics, Mar, p87

Portable Pile-Load Tester Checks Foundation Design

The California Division of Highways economically checks the bearing capacity of piles with light, portable equipment. In making the pile-loading tests, three piles are driven in a row at the pile spacing desired. The center pile is load-tested, with the outside pair acting as anchor piles.

Loading equipment includes an A-frame loading truss, a 120-ton capacity hydraulic pressure cell, and a truck-mounted hydraulic power apparatus to develop the necessary hydraulic pressure.

Cast-in-place concrete anchor piles are attached to the loading truss by bending reinforcing bars, cast in the concrete, over arms at the ends of the truss. Timber, steel or precast concrete anchor piles are attached to the truss by friction-type clamps.

The hydraulic pressure unit is rigged to maintain constant pressure of the desired increment, even though minor pile settlement occurs. The load is maintained by a constant-pressure mercury switch and a 1,000-psi. nitrogen-loaded accumulator. Loads may be applied, reduced, or completely removed by turning a valve.

The 120-ton capacity is much greater than is usually feasible by physical loading-test setups, such as the use of large water tanks.—Eng News-Rec, Apr 12, p44

Flame-Proof Nylon Fabric

A good wash-fast fire retardant for nylon fabrics has been developed by E. I. du Pont de Nemours & Co., Inc. The treatment employs a thiourea-formaldehyde resin.

The resin is prepared by reacting 76 parts thiourea with 60 parts of formaldehyde in 200 parts of water. One part of pyridine is added as a catalyst. The mixture is heated to about 40° C. to dis-

solve the thiourea. The reaction is complete in about 4 hr. if the mixture first is held at 60–80° C. for 1 hour. Then the mixture is diluted with water to give a solution of about 10% solids.

Just before impregnation of a fabric, 2 to 3% ammonium thiocyanate, based on the weight of solids in solution, is added to catalyze the polymerization. The pH is adjusted with dilute sulfuric acid to a level of 3–6.

The resin solution is applied to the fabric in a padder at room temperature. After padding, the fabric is air-dried at 240–260° F. and then cured for 5 to 30 min. at 280° F.

Following curing, the fabric is well scoured well below the boil, in a slightly alkaline solution to remove excess acid. Rinsing, extraction, and drying complete the procedure.—Textile World, Mar, p130

Cake Box That Flies

Henry & Henry Inc., manufacturers of bakers's ingredients, had the problem of providing distant prospective customers with a finished product made from its own products.

This is what they did: Air-express was selected as the method of shipment. It assured delivery before the cake spoiled. A special carton was designed to hold the cake.

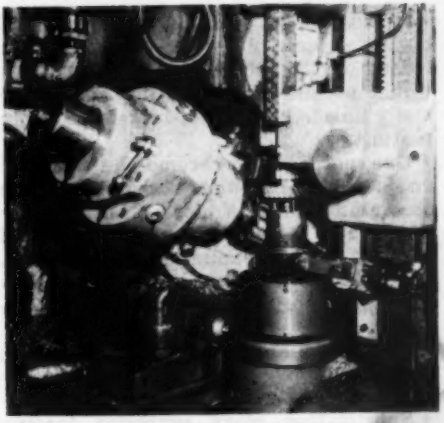
The carton is made of 3 pieces: (1) outer case with hinged window lid, (2) inner liner with hand cut-outs for easy removal of the cake, and (3) a white pressed-board disk fastened to the inner liner with a weight staple.

Ridges on the disk prevent side movement of the cake. The package can be tilted at a sharp angle in handling and the cake, because of the friction grip of the grooved disk, will not slide into contact with the liner and smear the icing.

Cartons are secured with gummed paper on all exterior seams to provide a seal that keeps dust out and moisture in.—Mod Packaging, Mar, p103

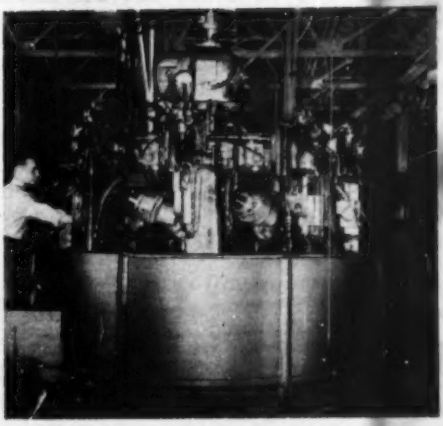
Hobs Triple Gear Output

Two-spindle hobber . . .



. . . is equipped with 4-in. triple-thread unground hobs, replacing single-thread hobs and tripling production rate for Chevrolet transmission gears on the preshave operation. For second-speed gears . . .

Eight-spindle hobber . . .



. . . has air-operated expanding collet chuck, automatic air center, and hobshifter head. The 26-tooth, 25/32-in.-face gears are cut in 3.1-min. cycle with speed of 156 rpm. and feed of 0.061 ipr.—Am Mach, Mar 19, p134

What Electroplaters Can Do About Nickel Shortages

Restrictions on nickel plating, imposed by the defense program, have caused a search for methods and materials that would permit bright plating parts normally finished by copper-nickel-chromium plating.

• One method is to chrome-plate directly on straight chromium stainless steel. The chromium, which is just a flash over the steel, gives it corrosion resistance equal to that of chromium-nickel stainless. Milkiness of finish can be prevented by a self-regulating, high-speed chromium solution.

• Less nickel and more copper is another answer. Copper can be substituted for two-thirds the usual nickel thickness.

• Substituting clear synthetic lacquer for two-thirds the nickel also is satisfactory. Nickel would be reduced from 0.006 in. to 0.0002 in. and 0.0005 in. of lacquer applied over the chromium.

• On parts where lacquer has been used to withstand high humidity, still more lacquer may be added and the nickel thickness reduced. A urea-formaldehyde composition is recommended.

• In certain applications the nickel can be eliminated entirely by using a heavy copper plate, chromium flash, and lacquer.

• Electroplated zinc is an attractive substitute. From 0.0002-0.0005 in. of zinc is plated on the steel, followed by a dip in chromate-type solution and a baking lacquer.—Steel, Apr 2, p81

Belt Shop Speeds Service

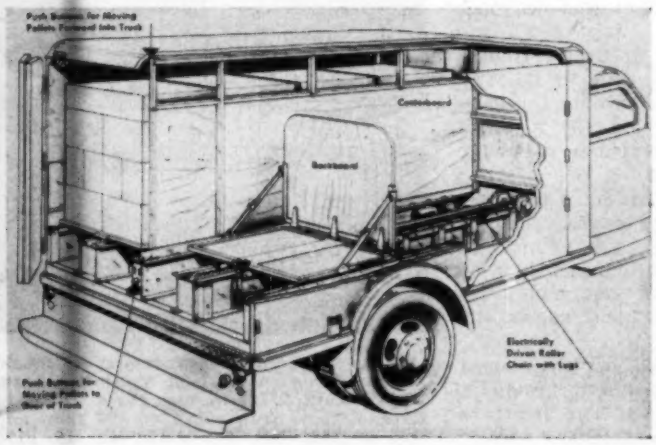
By buying coated abrasives of all types in rolls and then making up abrasive belts and disks to individual order, General Supply & Tool, Inc., Indianapolis, is able to give 1-day delivery to its customers at standard prices.

These benefits have resulted:

1. Customers are pleased with the quick delivery of abrasive belts and disks; consequently, sales have increased considerably.

2. Much of the cost of maintaining the belt shop is absorbed by the savings the firm gets by buying coated abrasives in bulk from the manufacturer.

3. Inventory costs are lowered, as it is unnecessary to carry specific lengths and widths of coated abrasives in stock. —Ind Dist, Apr, p77


Push Buttons for Moving Pallets Forward into Truck
Centerboard
Backboard
Electrically Driven Roller Chain with Lugs
Push Buttons for Moving Pallets to Rear of Truck

TRUCK TAKES PALLET LOADS

Distribution by Kraft Foods Co., is speeded by delivery-truck mechanism that allows loading and unloading without need for driver to enter truck body. Loaded pallets are drawn into body by endless chains with lugs to grasp pallet edges. Chains are powered by truck's battery and controlled by push buttons to move pallets either way. Centerboard and backboards prevent load shifting. —Food Ind, Mar, p87

If You Have Decided You Need a New Plant . . .

- ▶ **Call in professional aid. Early consultation will help prevent costly errors in money and materials**
- ▶ **Pick a plan that saves materials. The less complex you make the plan, the more materials you will save**
- ▶ **Consider substitute materials. Design for best efficiency. Substitute must be as good as material replaced.**

How To Get the Best Plant

YOUR BIGGEST PROBLEM will be to get the best plant you can from the materials available. Most construction materials, these days, are hard to get. So here are some suggestions:

An experienced team of industrial architects and engineers can help in planning the best possible plant with the materials available. This team should assist in developing flow diagrams for handling materials and people.

Simplicity of form saves materials. Eliminating parapet walls saves copper flashing. Eliminating monitor and sawtooth roofs will cut down on expensive construction and maintenance labor. Heating costs are reduced, but mechanical ventilation may have to be provided for proper air circulation.

Probably, the greatest shortages will be in metal products. The choice of a substitute must be determined by the use of the original metal. Wood can be used for roof decking or partitions, reinforced concrete for beams and columns, asbestos cement for duct work and some piping, and plastics perhaps for other types of piping.

Walls can be made of concrete, with forms being used over and over again. Or they can be made of precast panels or concrete blocks.

Lightweight aggregate panels may substitute for steel and aluminum panels. Molded panels of cement and mineralized wood shavings for exterior curtain walls, roof decks, and some floor slabs is another idea. Precast reinforced concrete beams can substitute for steel.

Skillful design also can save concrete and reinforcing steel. A thin reinforced arched slab may save up to 40% of the reinforcing steel needed in the thicker flat slab. Again, use of the continuous beam principle of design, as opposed to the simple span type, will conserve materials.

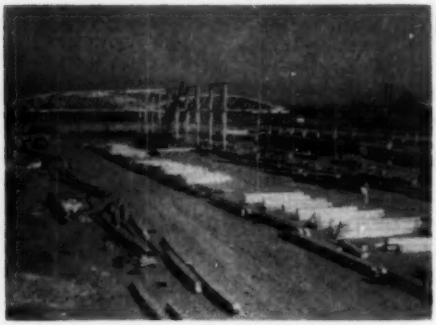
Where structural steel is concerned, both materials and labor are saved by designing for a maximum of shop fabrication and assembly of structural parts. Beams and girder designs, truss designs, and column spacings have been worked out for the utmost economy and conservation of steel.

Column spacing must be determined by the machine and process layout. It is poor economy to adopt a column spacing that would interfere with efficient manufacturing operations just to save a small amount of structural steel.

Wood trusses of various kinds can be used. Their design has been well standardized, and connectors have been developed to ensure economical, efficient framing.—Factory, Part II, Apr, p 66

Please turn the page for four examples of modern, economical plant design →

These Plants Cut Costs With the Right Materials and . . .



MATERIALS: Timber, lightweight basalt blocks, corrugated asbestos siding, and concrete floor slabs.—Sutherland Paper Co.

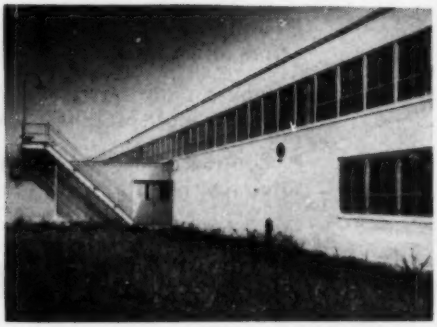
NONCRITICAL MATERIALS went into this plant. That means it should be relatively easy to duplicate in this period of shortages. Also, the plant's speedy erection and low cost make it worth careful study by companies in the market for simple, functional plants.

Within 90 days after work started on the sites, the plant was ready for placement of the owner's equipment. The plant cost less than $4 a sq. ft.

Part of the reason for the unusual speed and low cost lies in the fact that the plant was contracted for on a "package" basis. One organization designed, engineered, and erected it.

Building walls are made of wood columns, lightweight basalt blocks, industrial sash, and corrugated asbestos siding. Arched roofs are timber trussed, with an obvious saving in steel. First cost of these materials is low. Infrequent maintenance is needed.

Concrete slab floors were poured after the roof was in place to permit curing under the best conditions. One advantage of this plant is the great expanse of column-free floor space. No columns interfere with placement and operation of machines or with the flow of traffic and materials.



MATERIALS: Concrete block sprayed with waterproof paint, brick, lightweight welded steel roof deck.—Interchemical Corp.

MOST DYE PLANTS are multi-story. This one is not. Officials of this plant studied their handling problems and found that a vertical flow of materials would not be efficient. So they built their new plant around the operations of a fork lift truck. One-story construction gives them a horizontal flow of incoming raw chemicals, outgoing products. Fork trucks do almost all the heavy handling.

Walls not facing the highway are made of concrete blocks for economy. The block—sprayed with waterproof paint—gives the plant an attractive wall that requires little maintenance. Walls facing the highway are brick.

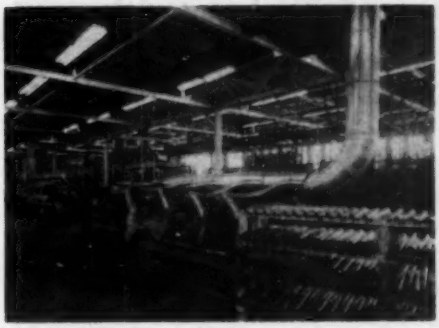
Building columns are recessed to permit the use of continuous sash. Above the sash is a narrow strip of corrugated aluminum siding. Use of the siding meant less masonry work and elimination of structural support for the roof above the sash.

Lightweight welded steel roof deck saved steel. Supporting steel beams rested on common pipe columns. Result —a rigid frame with a third less steel than conventional construction.

Timber construction was employed where acid fumes ruled out the use of uncovered steel for structural members.

. . . These Plants Feature Some Clever Ideas in Design

IDEAS: Build the plant to fit the raw material. Walls do not have to be reinforced.—Canada & Dominion Sugar Co.



IDEAS: Putting the office in the factory helps simplify expansion by allowing room for future machines.—Motor Products Corp.

THE RAW MATERIAL STORED in this warehouse determined its shape. Key to the design of the warehouse was the angle of repose of raw sugar—39°. So the builders simply put a protective enclosure around a sugar pile of predetermined size. The design offers possibilities to any manufacturer who stores quantities of bulk material.

The roof angle is 42° instead of 39°. That permits putting a belt conveyor under the roof peak. It distributes sugar over the pile.

This design gave the most useable space for less money. When the warehouse is full, sugar extends only 6 ft. up the walls. Any thrust is minor and is easily countered. Silos would have been costly to build and operate. A bin-type building would need heavily reinforced walls.

Pin-connected trusses support the roof, formed of lightweight concrete slabs. Wood-fiber insulation covers the slab and a four-ply bonded roof covers the insulation. They all help control condensation that would damage sugar.

Floors are concrete with a 1½-in. asphalt and siliceous coating on top to prevent reaction between the sugar and the lime in the concrete.

BUILT with a view toward the future, this plant was located in a space big enough to grow in. Two major railroads and good highways are nearby. And there is enough labor to draw on.

Offices are located inside the factory. They are separated from the manufacturing area by a wood-fiber insulating wall. Movable steel partitions permit rapid changes in office setup. To keep costs down the standard factory ceiling serves as the office ceiling.

When the time comes to expand, the offices will be housed in an addition to the factory structure and machines will take over the office area. The design permits further expansion, if desired.

Waste space is filled by a substation. Normally nothing would overhang the entrances and exits. But the plant has built a platform to hold a 1,000-kva. substation over the entrance to the plant.

A welded steel frame reduced steel content and yielded a rigid structure. The frame, comprised entirely of H-sections, kept the need of interior columns to a minimum.

Sidewalls are corrugated asbestos, brick, and continuous sash. These materials present a good appearance and need only nominal maintenance.

New Television Picture Tube Saves Critical Materials

Shortages of Alnico and copper have forced television-tube manufacturers to develop tubes that need no focusing magnets. One development, made by Radio Corp. of America, is a new electrostatic-focus gun.

In this gun, the electron beam is accelerated to full voltage and then focused by a short decelerating field. Besides the three usual grids, the new gun has two additional electrodes; grid 4 focuses the electron beam and grid 5 is connected to grid 3 to complete the deceleration-type focusing lens.

This electron gun can be used in all sizes of picture tubes. Another advantage is that the need for complicating receiver operation by either providing a user focus control or requiring the service man to make a compromise adjustment is eliminated.

The service man is not required to make the critical focusing-magnet alignment, which in the past has not always been the best one. The ion-trap magnet adjustment is also simplified because more space is available and the shunting of its field by the field of the focusing magnet is avoided.—Electronics, Apr, p118

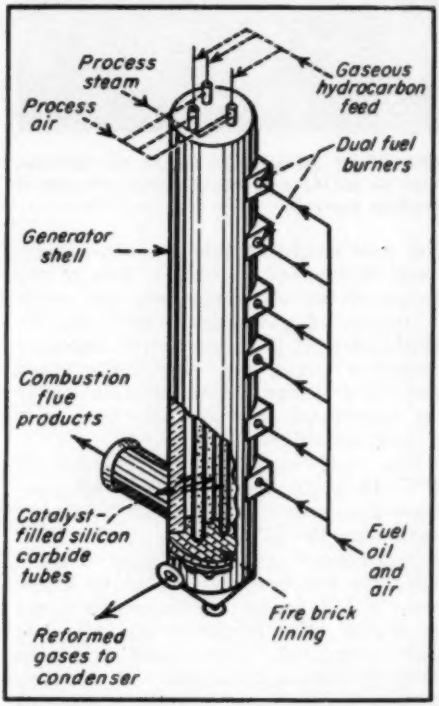
How To De-Enamel Ware

Successful removal of all types of enamels salvages defectively enameled parts that once would have been scrapped. A 7-ton pilot plant is now being operated on this work by New Process D-Enameling Corp.

The process solution consists of 8-10 lb. of caustic soda per gal. of water, 1-1½ lb. of sodium silica fluoride, and ½-1 lb. of a wetting agent. Treating temperature is 300° F.

The solution will strip porcelain enamel from steel at 0.005 in. the first hour, 0.008 in. the second hour, and 0.009 in. an hour from then on. In 2 hr., about 90% of the enamel is stripped off.

Parts are then removed, rinsed with water, and sandblasted to remove sludge and remaining 10% enamel. Resulting surface is better for enameling than was the original surface.—Steel, Apr 2, p91



CATALYTIC GAS REFORMER

Now going into commercial stage, with first unit being built in Belgium, is continuous catalytic gas reforming process developed by Gas Machinery Co. Product is synthesis gas, which can be used for making ammonia or methanol, for hydrogenation processes, and for metal and ore reductions. Feed enters at top, is reformed in catalyst-filled silicon carbide tubes, and comes out at bottom as H_2, CO, CH_4, and other saturated paraffins. Investment and operating costs are low.—Chem Eng, Apr, p190

Vibrating Abrasive Cuts Hard-To-Cut Materials

A new machine produced by Cavitron Corp. combines ultrasonic vibrations and commercial abrasive to cut through materials such as cemented carbides, hardened tool and die steels, sapphires, and diamonds.

A blunt tool, shaped to the desired hole or form to be made in the work, is vibrated 27,000 times per sec. on the work piece by an electronic oscillator. A liquid containing an abrasive, such as boron carbide, flows over the work and under the oscillating tool. The rapidly vibrating tool hammers away at the abrasive particles. This forces each particle to take a tiny bite out of the work piece. Result is smooth, yet speedy, cutting of the hardest materials.

Holes, opening, and recesses can be formed in diameters from 0.007 to 2 in., with tolerances of 0.002 in. For most purposes, no further finishing is necessary.—Business Wk, Mar 3, p80

Packaging Material Saved

Shortages are forcing food processors to conserve packaging materials. Here is how to do it:

- Reuse containers as much as possible—keep bottles in circulation, employ sealing techniques on container covers so they can be opened without damage.
- Avoid overpackaging by using as little paperboard as needed. Use largest sizes practical—double the number of unit packages in the case.
- Redesign packages to use less critical material. Avoid the double overwrap. Substitute glass for metal, multi-wall bags for wire-bound boxes, windowless for window-type cartons.
- Maintain packaging machines in good order to reduce material scrap loss and to avoid wrong-weight packages that have to be rewrapped.—Food Eng, Apr, p123

ELECTROMAGNET DOBBY (upper center) on this Swiss sample-weaving machine speeds . . .

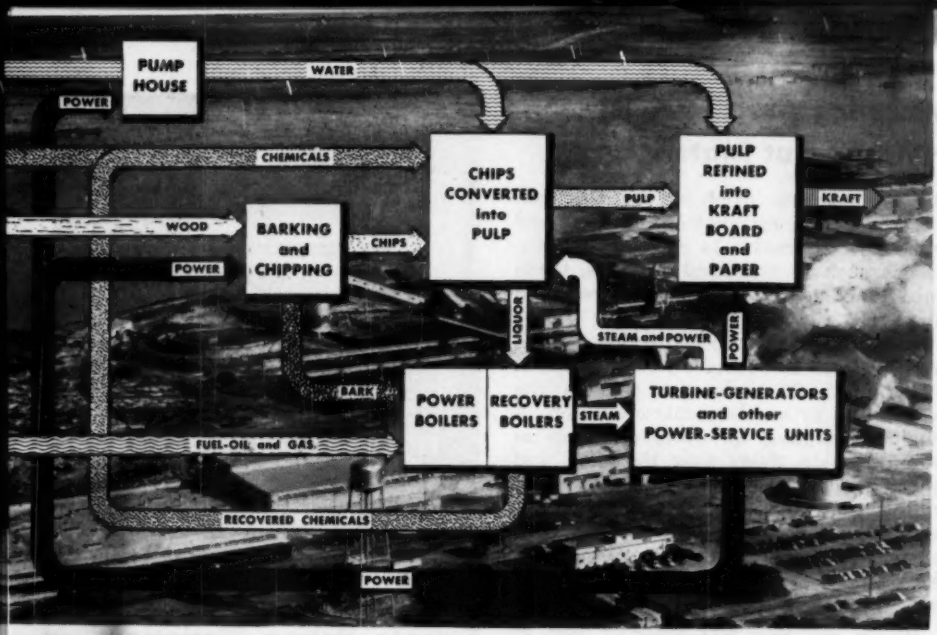
Sample Design Variations

FABRICS can be quickly and easily woven on a new Swiss loom located at the Hudson Service and Storage Co., Union City, N. J.

While the sample-weaving machine operates from an electric dobby, the fabric that it produces can be duplicated on any conventional dobby loom. Principle advantage of the new machine is that blanket samples can be quickly woven even before a draft is made. When working with the sample loom, drafts are made from the pegging of the loom rather than vice versa, which is normal with samples made on conventional looms.

In the electromagnetic dobby, each shaft is controlled by a direct contact system operating from magnetic coils. The original design-card punchings let the feelers through to make electric contact and lift the individual shafts. Changing a peg on the dobby changes the sequence of lift of a harness and creates new interlacing effects.

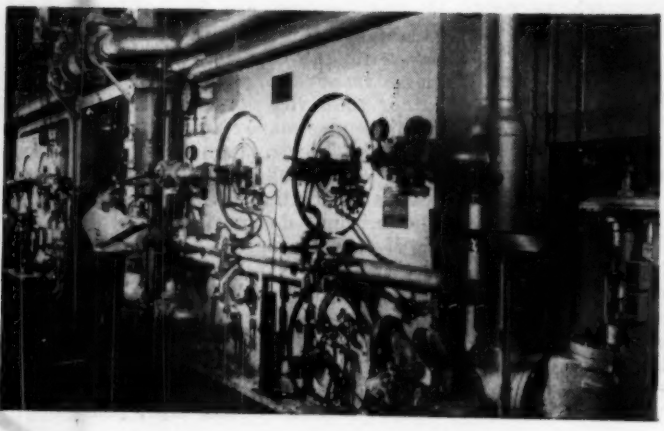
A spring picking motion replaces conventional picker sticks on the sample looms.—Textile World, Apr, p89



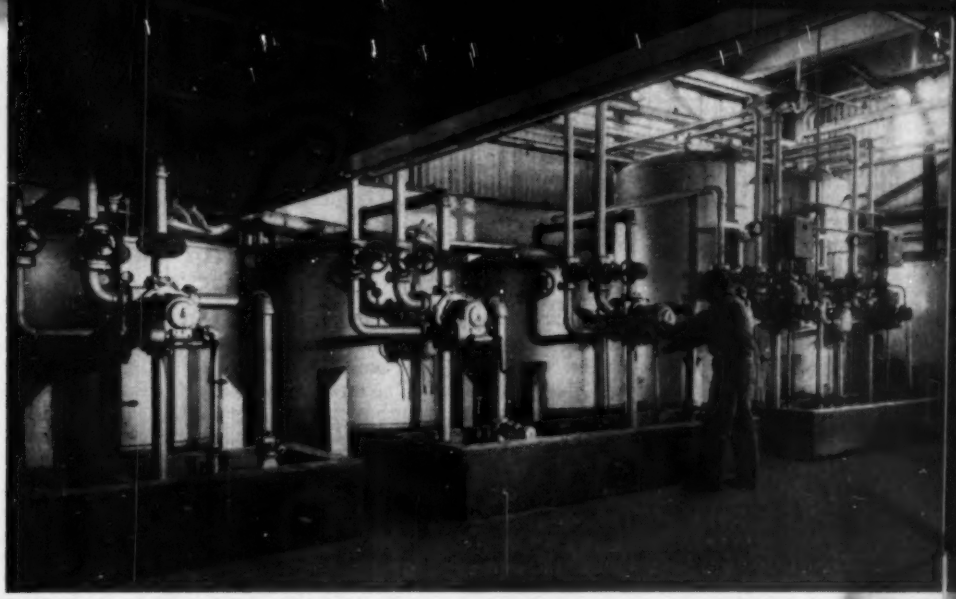
1 FLOW CHART, spelling out how efficient use of wood byproducts and heat from chemical recovery reduces need for purchased power in paper mill, presents a formula for . . .

Paper-Mill Power Economy

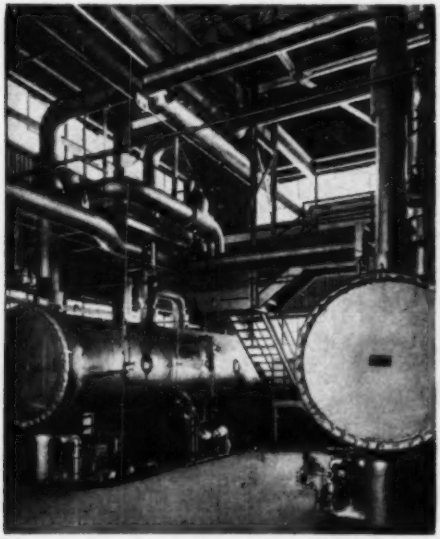
Well designed plant of Fibreboard Products, Inc., meets today's paper-mill problem of higher-pressure process steam and a greater power-steam ratio



2 STEAM is generated by a Babcock-Wilcox black-liquor recovery boiler delivering 169,000 lb. per hr. of steam at 575 psi. and 700° F. and by two oil- or gas-fired generators delivering 160,000 lb. per hr. Recovery boiler burns 28,100 lb. of black-liquor solids per hr. on basis of 62% solids content entering furnace and 50% solids entering evaporator



3 WATER TREATMENT consists of three pressure filters (left) and two zeolite softeners. It handles water leaving the clariflocculator. The plant uses as much as 14-million gal. daily from nearby river for both process and power



4 FEEDWATER MAKEUP evaporators have capacity of 32,500 lb. per hr. at 26° F. temperature difference. They operate single effect in parallel, double effect, or triple effect as requirements change

5 GENERATING POWER by two double automatic extraction condensing turbines (4,000 kw.) and one single automatic noncondensing turbine (4,000 kw.) gives low power cost.—Power, Apr, p71

How To Blank and Shear Glass Reinforced Laminates

Conventional techniques with standard equipment can be employed in blanking and shearing Fiberglas laminates. Here are a few hints on how it is done:

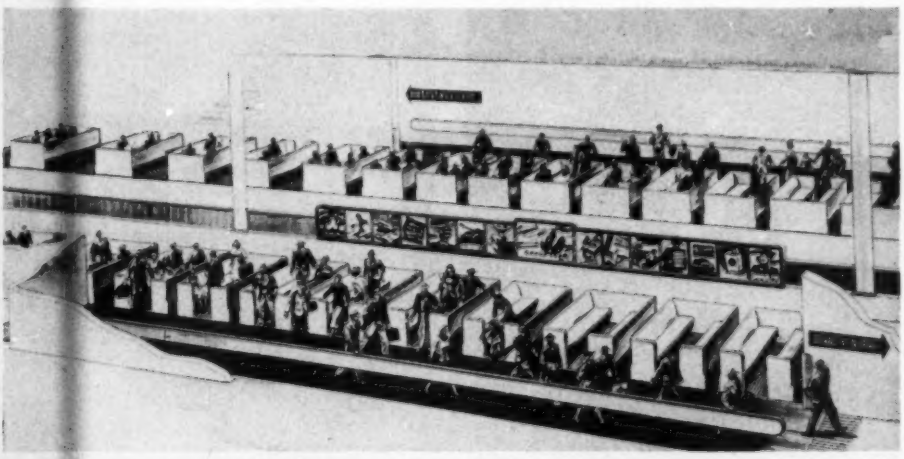
1. Press capacity is about one-half that for the same operation in metal; about the same as for phenolic laminates.
2. Die clearances should be one-half those specified for steel. Shear gibs should be snug and blades sharp—about the same as for phenolics.
3. Heated stock is neither required nor desirable.
4. Stripping devices will require two to three times the loading used for steel blanking dies in order to overcome tendency of reinforced plastics to grip the extended punches.

Sharp edges can be obtained on stock up to $\frac{1}{32}$ in., fair edges up to $\frac{1}{16}$ in., acceptable edges up to $\frac{1}{4}$ in. Die life between sharpenings will be about one-half that for steel and three-fourths that for phenolics.—Mod Plastics, Apr, p103

Pre-Packaged for Surgeon

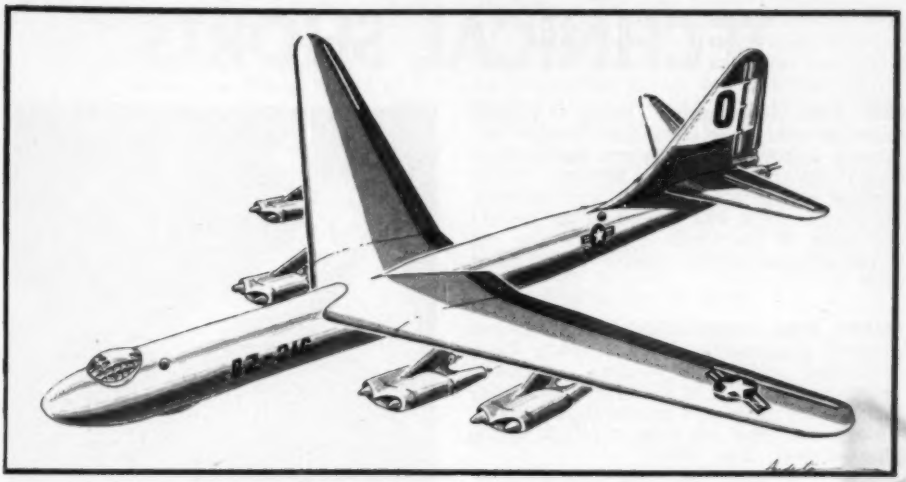
Minnesota Mining & Manufacturing Co. has introduced vinyl-surgical drapes factory-sterilized in the package and ready for immediate use.

The new drapes are made of soft but tough, drapable vinyl film, green in color for eye ease and edged with a pressure-sensitive adhesive strip. They are moisture-proof and adhere to the skin upon contact, forming an impermeable barrier to contamination. Lightweight construction and pressure-sensitive adhesive permit them to conform to irregular areas of the body.—Mod Packaging, Mar, p96



CARS WOULD RIDE BELTS IN NEW YORK SUBWAY

Goodyear Tire & Rubber Co. has come up with an idea that may serve as a low-cost and more efficient replacement for the subway shuttle trains between Times Square and Grand Central Terminal in New York. Three blocks separate the two terminals. Small cars would be placed on an endless belt between the two terminals. Passengers would enter from a belt moving at 1½ mph. A bank of wheels would speed cars up to 15 mph., pass them to a fast belt; another bank would slow them down again to unload. Transparent plastic domes will cover each car.—Railway Age, Apr 9, p64



JET VERSION OF B-36 INTERCONTINENTAL BOMBER

Two swept-wing all-jet-engined versions of the B-36 are to be built at Consolidated Vultee's Fort Worth, Texas, plant. One of the huge planes will probably fly late this year. Current B-36E bombers have a wing span of 230 ft. Over-all dimensions of the swept-wing version remain essentially the same, but wing panels on either side of the main landing gear and lateral tail surfaces will be swept back at 35°. Eight jet engines are to be slung two in a pod in two pods beneath each wing. Design performance calls for a top speed of 550 mph. at 55,000 ft. Strategic requirement for carrying 10,000 lb. 10,000 mi. remains the same.—Aviation Wk, Mar 26, p15

Extrudes Propeller Blades in Three-Stage Process

Spectacular savings in materials, manhours, machining time, tools, and manufacturing floor space result from development of a new mass-production method of making airplane steel propeller blades. Hollow blades are extruded in one piece.

In this method, developed jointly by Curtiss-Wright Corp. and the U. S. Air Force, three extrusions that require only a few minutes replace hundreds of hours of tedious hand work needed for making a welded blade.

A 400-lb. chromium-nickel-molybdenum steel billet is squeezed hot through a series of dies with a series of mandrels to produce a 10-ft., 200-lb. blade tube. As a welded blade requires an original 750 lb. of metal, material saving is 47%.

The billet, 8 in. long by 14 in. in dia., is heated in a salt bath, then lubricated with tallow, heavy oil, or graphite. The first pass produces a blank with long shank, heavy unextruded portion. Mandrel does some shaping. At end of second pass, shank is completed, including a slow taper to the part that will become the blade.

The final extrusion lengthens the piece, from 30 in. to 10 ft. or more. Walls of the blade section are tapered in thickness from shank to tip. Fins, formed on the sides, become the leading and trailing edges of the blade.

Blades are finished by machining shanks, machining and grinding blade portion, and twisting.—Am Mach, Mar 5, p128B

TECHNICAL SHORTS

Mill Uses Radioactive Tracer—British manufacturer of woolens had trouble obtaining uniformly dyed fabric. Radioactive tracer techniques were applied. Tests showed presence of sodium and calcium. Calicum content was related to the resultant color of the cloth. Remedy was use of presoftened water.—Textile World, Mar, p256

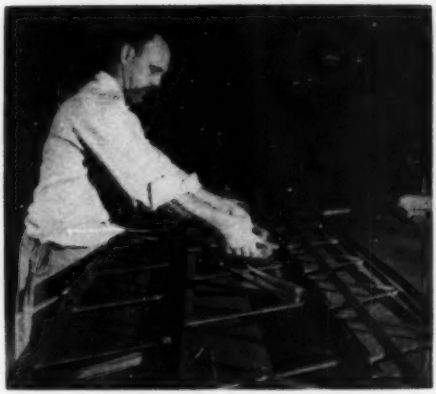
Handy Pipe Roller—Heavy pipe, unless properly supported, is hard to rotate when threading, cutting, or welding. A handy roller can be made of discarded ball bearings. Inner races are welded to a support, while outer ones are free to roll with the pipe.—Power, Apr, p130

Rig Has High Reach—To drill high on cliff faces for an Arizona highway project, Fisher Contracting Co. put a drill platform on the tip of a wheel-mounted crane's 70-ft. boom. The platform carries a drifter on a bar spanning the deck and is equipped with floodlights for night drilling.—Const Meth & Equip, Mar, p86

Geiger Counter Controls—Radium chloride points, set at various levels in a 239-ft. catalytic unit at Salt Lake Refining Co., activate Geiger counters. Catalyst level in unit is noted by counters and recorded on control house dials.—Chem Eng, Mar, p199

Helicopters in Italy—Two Italian companies, Hersilta and Ela, operate U. S. helicopters for mountain photography, passenger hopping, and spraying for malarial control. Operations have proved so profitable that both companies are seeking more machines.—Aviation Wk, Mar 19, p11

Neoprene Coats Structures—Du Pont's synthetic rubber, neoprene, can be applied as air-drying protective coating for industrial maintenance work on structural steel, concrete, wood, and exterior surfaces of tanks and equipment. Neoprene solution is applied by brush or spray in one coat 5 to 10 mils thick. Heat is not needed to set the coating.—Steel, Mar 26, p118



GRIP PLIERS HELP ASSEMBLY

Grip pliers speed the job at Taylor Reed Co. of fabricating girders of angle iron and rods. Templet is first made, then angle iron is attached by pliers to templet for welding. Pliers are much faster than screw clamps and interfere less with welding operation.—Food Eng, Apr, p11

Vaporizes Metal—Laboratory induction heating evaporator, developed by Radio Corp. of America, melts metal for depositing on nonconducting materials. It can melt more metals and reduce surface contamination more than can conventional filament heating method.—Electronics, Apr, p126

A Safe Mine—This is a safe mine defined: Everyone knows what to do, the correct way to do it, and is able to do it that way and has the determination to do the job only by following the safe way.—Coal Age, Mar, p104

Polishes Aluminum—New process for chemical polishing of aluminum has been developed by Light Experimental Institute of Italy. Outer lamina of metallic surface is dissolved, reducing thickness by 0.015-0.025 mm. according to length of immersion and bath temperature.—Am Mach, Apr 2, p71

Remote-control Trouble Shooter—American Telephone & Telegraph Co. keeps check on long stretches of coaxial cable by signalling equipment. System can indicate 160 trouble conditions by an indicator light panel at central station. More than 100 corrective actions, such as starting generators in distant offices, can be made from central station.—Elec C&M, Mar, p136

Buttermilk Ice Cream—U. S. Dept. of Agriculture announces a new idea—ice cream made with buttermilk-solids mix. Flavor and texture are better than with skim-milk solids. Mix is made by replacing 80% of sweet condensed skim-milk by buttermilk.—Food Ind, Mar, p90

Wax Is Metal-working Lubricant—S. C. Johnson & Son, Inc., says special wax blends permit the drawing of stainless steel far beyond its theoretical capacity. They are now being tested as a replacement for the copper flashing on stainless-steel wire used for cold heading.—Factory, Part 1, Apr, p60

Photos on Ceramics—New process, called the Charlton Photo-Ceramic Process, allows rapid reproduction on ceramic ware of photographs and designs in one or more colors. It can be applied as an underglaze or overglaze method of decoration or on green ware for a one-fire operation.—Ceramic Ind, Apr, p127

Big Blow Torch—Contractor on McChord Field runway had to burn piles of slashings and stumps after a heavy rain. A 50-gal. oil drum, an airplane propeller, pump, and a hose on a tractor solved the problem. After wet pile is sprayed with oil and starting fire, propeller generates 35-mph. wind that keeps fire roaring.—Eng News-Rec, Apr 19, p10

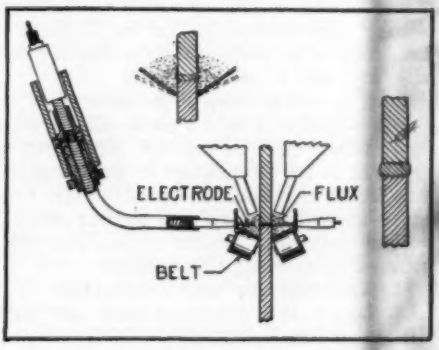
Airborne Pipe-line Pipe—A 6-in. airborne pipe-line pipe is being developed by Universal Moulded Products Corp. Material is reinforced polyester. Cloth and rovings are wrapped around a hollow steel mandrel and resin impregnated. Cellophane and heavy paper are wrapped around pipe. Steam, circulated through mandrel, cures the pipe. Cellophane shrinks and applies needed pressure.—Mod Plastics, Apr, p93

Sawdust Food for Cattle—Exposure to high-voltage electrons or cathode rays may turn sawdust into cattle feed. Experiments by General Electric Co. have built up a cellulose-lignin combination that is digestible in a laboratory version of a cow's stomach.—Business Wk, Apr 14, p114

Sprays Power-line Poles—Consumers Power Co., Mich., is experimenting with spraying preservative on poles by means of circular tank surrounding the pole. Spray heads inside tank cover the pole circumference as tank is moved up the pole.—Elec World, Mar 26, p122

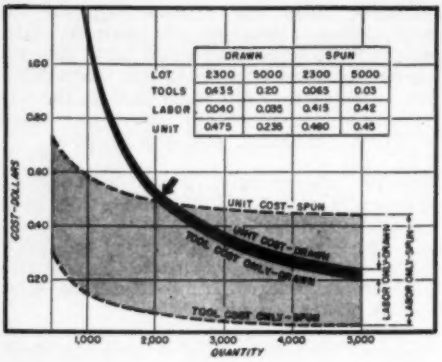
Mexicon Cellulose—A new Mexican firm, Celulose Nacional, will soon be making cellulose from cotton seed. The new plant, which will be located in Tamulipas State, will be one of a very few of its kind in the world.—Paper Ind, Mar, p1337

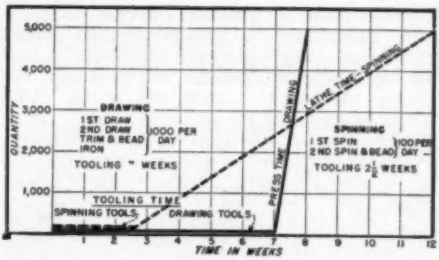
Easy Freeze—Food-freezing units may change in design because of trifluorobromomethane. Two-stage compression is now needed to get down into deep-freeze range, but the halocarbon can do the same job in one easy step.—Chem Ind Wk, Mar 17, p17



THREE O'CLOCK WELDING

New 3 o'clock welding process, developed by Lincoln Electric Co., removes limitation of "downhand welding only" from submerged-arc welding. Horizontal weld can be made with plates positioned anywhere from flat to vertical. Welds may be straight or irregular. Flux is retained around joint by special moving belt. Welding sideways allows working from both sides.—Weld Eng, Mar, p44





***QUANTITY-TIME CHART** shows comparative tooling and production times on a 6-in. shell*

***QUANTITY-COST CHART** compares total costs*

When To Spin Metal Parts

Spinning of sheet metal into circular parts is a quick and cheap production method when it is applied to the right applications

METAL SPINNING is one of the few remaining legacies of the ancient metalworking art still practiced in this machine age. In Europe and some other parts of the world, spinners go through a long apprenticeship. In the U. S., the tendency is to resort more to mechanization and less to manual skill.

But, in either case, a decision must be made whether to spin a particular article or to select another method. Spinning in general is an alternative to drawing for producing certain classes of hollow vessels—utensils, covers, and similar parts.

The following points should be considered in making the decision:

1. Tool cost per unit (variable).
2. Labor and overhead costs per unit (more or less constant).
3. Delivery requirements.
4. Contour problems, such as reentrant curves.
5. Possible use of existing standard press tools for breakdown operations prior to spinning.
6. Dimensional accuracy of the product and limits of processes being considered.

As spinning is predominantly a manual operation, labor costs per unit are high. But it permits simple, economical tooling. On the other hand, drawing requires costly tooling but is capable of much lower labor costs per unit. So these cost components must be analyzed in relation to lot size before a comparable cost can be determined.

As tool cost varies and labor cost is constant, the variable in spinning is the low component and in drawing the high component. The unit cost of a stamping, therefore, drops faster than that of a spinning as the quantity increases.

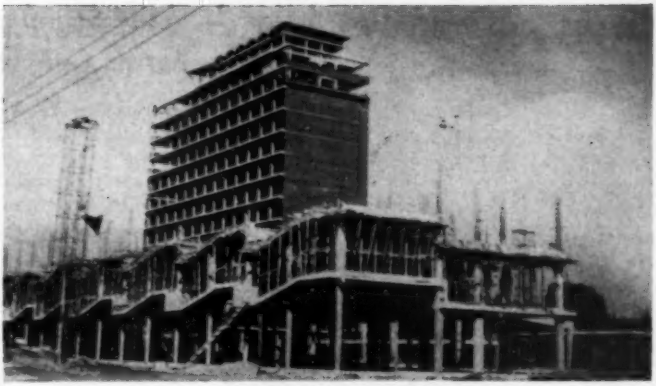
But up to a certain point, the high cost of drawing dies brings unit cost above that for spinning. It is this demarcation point that must be found when analyzing probable costs.

Thus, the curves (chart on the left) are based on typical costs of producing a 6-in. dia., 6-in. deep beaded aluminum shell by both processes. Full lines represent drawing costs, and dotted lines spinning costs. Lower lines represent tool costs only, while upper lines show total unit costs.

The crossing point of the unit cost

FORM-BUILDER'S NIGHTMARE

Little of concrete classroom building at the University of Mexico, Mexico City, is on the level. Floors slope to give theater effect, increasing students' view but complicating construction. —Const Meth & Equip, Apr, p66



curves is the quantity demarcation point beyond which drawing is more economical.

In this particular case, costs are about the same at 2,300 pieces. Hence, unless other factors are present to affect the choice of method, quantities less than 2,300 should be spun and quantities over 2,300 should be drawn.

But other factors often affect the choice. Delivery may be critical. Spinning tools may be built faster, and parts delivered sooner. Spinning tools for this job (chart on the right) could be made in 2½ weeks.

But when quantities are larger, the higher production rate by drawing can deliver parts faster even though tooling times is longer. Drawing for this particular part would catch up to deliveries by spinning at about 2,700 pieces—at the 7½-week mark.

Re-entrant contours are often more easily and cheaply produced by spinning than by drawing. But again if the quantity of parts can absorb the considerably higher tool costs required for re-entrant contours, drawing may be the more desirable method. Possible repeat orders should not be overlooked because including them into the calculation lowers the demarcation point.—Am Mach, Mar 19, p145

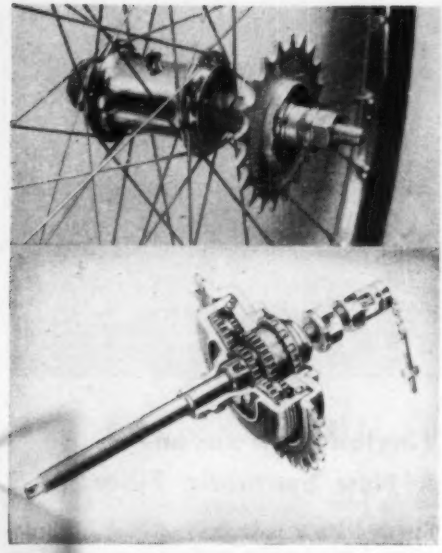
Vinylon from Japan— A New Synthetic Fiber

VINYLON is a polyvinyl alcohol fiber developed by the Synthetic Fiber Manufacturers Group of the Japan Synthetic Textile Assn. The new fiber is being proposed as a suitable material for the manufacture of clothing items. Various treatments can give Vinylon the appearance of silk, cotton, hemp, or wool.

Vinylon is produced in the form of monofilament yarn, continuous multifilament yarn, multifilament tow, and staple fiber. Special staple is made to blend with cotton, wool, or rayon staple.

Vinylon is made from polyvinyl alcohol whose basic raw materials, limestone and coke, are plentiful in Japan. The fiber is spun on the wet or dry system from the polyvinyl alcohol dissolved in hot water.

The spinning solution is extruded into a coagulation bath, dehydrated, coagulated, and spun into fiber. Heat treatment combined with acetalization imparts water resistance to this normally water-soluble material. It is then washed, oiled, and dried to form the finished product. It may be crimped or given other finishes to obtain the desired appearance.—Textile World, Apr, p123



PLANETARY-GEAR BRAKE

Triplespeed Coaster Brake was designed by New Departure Div., General Motors Corp., to provide a three-speed transmission easily installed in existing bicyles. Regular wheel sprocket is removed, and new unit is slid into place. Control cable is led to handlebar grip. Planetary gears give travel of 14, 18 and 24 ft. per pedal revolution.—Prod Eng, Apr, p110

Cable Shipped on Nine Cars

Single-piece submarine cable, 7½-mi. long and weighing ¾-million lb., was shipped 3,000 miles across the U. S.

At the Okonite-Callender Co. plant where the cable was made, it was fed directly from the armoring machine onto the nine gondola cars. Approximately 4,400 ft. were coiled into each car, and the cable was then looped over into the next car, coiled, then looped again until all nine cars were loaded. To guard against a possible uncoupling, the cars were fitted with safety chains and the coupler pins tacked-welded in place.—Railway Age, April 2, p64

Wide Stainless-Steel Strip Forms Continuous Conveyor

Bituminous Coal Research Inc. has apparently solved the continuous room conveying problem in continuous mining.

A strip of stainless steel, 1/32 in. thick by 36 in. wide and capable of being coiled onto a small spool, has been used experimentally as a shaking pan line for distances as great as 600 ft.

The coil, or spool, is mounted on slides, and a shaking motion is imparted to the coil by a standard shaker drive. The free end of the strip is attached to a set of crawlers. These crawlers pull the strip from the coil and follow the continuous-mining machine as it mines a room.

Simultaneous conveying and extension are achieved without interrupting the flow of coal. A short swivel-type chain conveyor feeds the coal from the continuous-mining machine onto the shaker pan.—Coal Age, Apr, p81

Electrons Sterilize Foods

Bombarding foods with electrons from a Van de Graaff generator is the latest technique in sterilizing foods. Vegetables, meats, and fish have been irradiated in tins while fresh and stored at room temperature for 2-4 years. Shelf life of foods that have a protective covering of their own—apples, peaches, melons, and eggs—has been extended for months.

High-energy electron streams—several million electron-volts—are required. And each product requires a different dosage. Massachusetts Institute of Technology and Electronized Chemicals Corp. are engaged in studies of the process. How the electron beam kills bacteria is still unknown, but kill it does.

Cost of preserving foods and drugs electronically is still high. But investigators say it can be made competitive with current sterilization methods.—Business Wk, Apr 7, p81

Huge Refrigeration System Controls Blast Moisture

Gas in the molten metal formerly caused flaws in gray-iron castings made in permanent molds by Delco-Remy Div. of General Motors Corp. A study showed that scrap loss closely followed the humidity curve, such as 15% loss for 10 grains of moisture per cu. ft.

As higher humidity meant greater loss, a refrigeration system was installed to control the moisture content of the cupola blast air. It cools air to 40° F.; at this temperature the air can hold no more than 3 grains of moisture per cu. ft.—not enough to affect quality of castings.

Cupola air is filtered, cooled by refrigerator coils, and passed through a condensing room where water falls to floor and is drained out. Dried air then passes to the cupola.

Refrigerator compressors—four Frigidaire units of 80-ton capacity—dehumidify 6,5000 cu. ft. of air per min. Operation is completely automatic.

Both maintenance and operating costs are low. To add to the economy, water from the coils is pumped to the dust-suppressor sprays on top the cupola stacks and then is used for the third time in the slag removal system.—Foundry, April, p134

Arc-Welds Stainless Steel

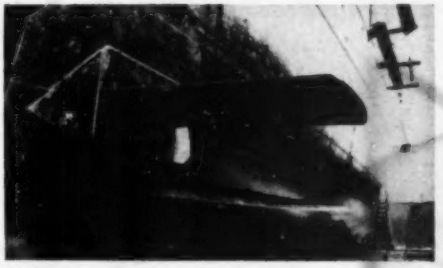
When stainless-steel weldments cannot be annealed after welding or when weldments are to be employed in high-temperature (800-1500° F.) service, columbium is usually added to prevent intergranular corrosion.

But columbium is now scarce. So some other means must be applied to prevent the precipitation of chromium carbide that causes intergranular corrosion.

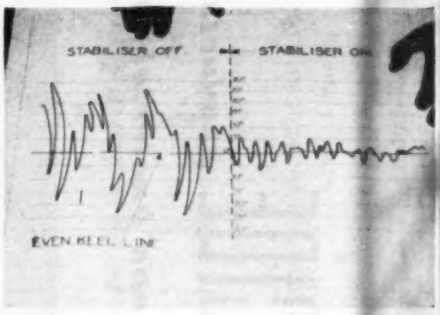
The obvious answer is to remove the carbon, that is, to use extra-low-carbon grades of stainless steel. These steels have about 0.03% carbon instead of 0.07%.

Arc welding is done with extra-low-carbon electrodes. ELC electrodes work successfully with type 347 plate (columbium stabilized) or type 321 plate (titanium stabilized). Type 316 ELC electrodes are also available for welding type 316 ELC plate and type 318 plate.—Steel, Mar 19, p71

Movable Stabilizing Fins . . .



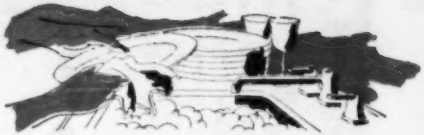
. . . Keep Ship on Even Keel



The British 24,000-ton H.M.S. Chusan is fitted with stabilizing fins to reduce ship roll. The stabilizer has two fins, one on each side of the ship. When the moving ship heels, the fin on the low side tilts so that its forward edge is up. Water pressure against the fin shoves the ship back to an upright position. Meanwhile, the fin on the upper side tilts so that its forward edge is down, and the water forces this side down.—Business Wk, Mar 31, p50

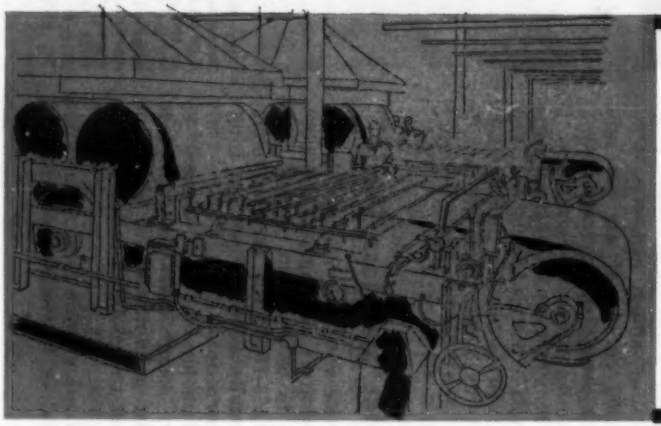
let DOWICIDE *products*

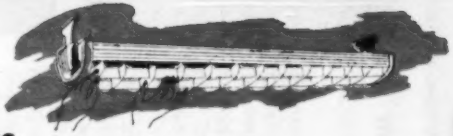
reduce mold and bacterial attack



ALKALIES

Dow alkalies serve many varied industries. Caustic soda is used to manufacture soaps and cleaning compounds; in refining vegetable oils; in the processing of rayon, paper and petroleum products. Other Dow products include caustic potash, calcium chloride and Sodium Orthocilicate Cleaning Compound. Information on request.





PLASTICS

Styron (Dow polystyrene) is a thermoplastic material increasingly used by manufacturers to bring added sales appeal and low production costs to such items as lighting fixtures, radio cabinets, and electric refrigerator parts. Other Dow plastics include: Ethocel (Dow ethylcellulose) a tough plastic that combines lightness with good shock resistance; Saran for extruding and weaving into seat covers, screens; Saran film used for packaging.

In industry many lost man hours can be traced to mold and bacteria growth! You can guard against these attacks which result in delayed production, wasted

GLYCOLS

materials and shrinking profits with Dowicide chlorinated phenol products.

There are fourteen of these Dow industrial germicides and fungicides made to fight spoilage caused by microorganisms. Alone or in combination, they are bringing economical microbial control to many industries. They protect sizings and coatings in textile manufacturing. In paper, they give effective slime control and make finished products mold-resistant. In paints, they prolong shelf-life of water types and prevent unsightly growths on oil-painted surfaces.

Dowicide products are widely used in many other industries . . . leather, disinfectant, lumber, and farming number among them. They are produced in both oil and water-soluble types.

For more information about these outstanding products, write to Dow.

These Dow chemicals have such widely diversified physical properties that they are in great demand in many industries. Check this list of a few of the many jobs they are now performing: a solvent or carrier in pharmaceuticals; a moistening agent in tobacco and foods; a drying agent in natural gases; a freezing point depressant in industrial and automobile antifreezes. More details about glycols on request.

SOLVENTS

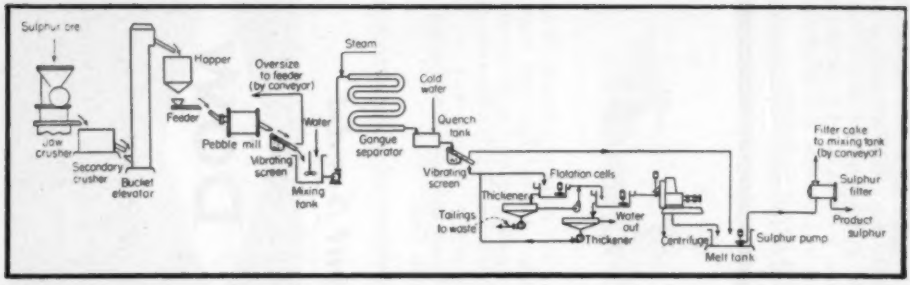
Dow is the source for a wide range of solvents. Due to their ability to quickly dissolve greases, fats and waxes, Dow chlorinated solvents are in wide demand in the metal working industries. In addition to this type, many other Dow chemicals have noteworthy solvent power. Among them are Dowanol glycol ethers, polyglycols and alkanolamines. For information about these products, write Dow.

There is a Dow Product for Your Chemical Needs!

THE DOW CHEMICAL COMPANY
Midland, Michigan, U. S. A.

DOW CHEMICAL OF CANADA, LIMITED
Toronto, Canada

DOW
CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE



***FLOW DIAGRAM** shows the seven major steps in processing low-grade surface ores containing free sulfur to produce sulfur of 99-100% purity*

New Sulfur Recovery Process

- ▶ **Grinds, slurries, coalesces, cools, floats, melts, filters**
- ▶ **Recovers over 90% of sulfur content from low-grade ores**
- ▶ **Promises to unlock the earth's vast deposits of surface sulfur**

SULFUR from low-grade surface ores that contain the free element is promised as one way to defeat the growing sulfur shortage the world over. The means: a brand new process developed by Chemical Construction Corp., a subsidiary of American Cyanamid Co.

The first commercial plant to use the process is being built in Colombia. Other plants are under negotiation, both in the U. S. and overseas.

The Chemico process recovers sulfur in seven steps:

1. Ore is ground and screened to −28 mesh, thereby disintegrating part of its free sulfur into fines. Grinding is done in a jaw crusher, secondary crusher, and a pebble mill.

2. Ground ore is suspended in water to form a slurry of 15-50% solids.

3. Slurry is heated with agitation to a temperature of 250-275° F. (above the melting point of sulfur), causing fines to coalesce into tiny globules. Heating is done by superheated steam in a gangue separator, which essentially is a pipe coil. Coalescence of the sulfur by eddy currents in the coil means extremely high production rates, compared with earlier recovery methods that relied on heat alone to separate the sulfur.

4. Slurry is cooled to 140-195° F. by cold-water quenching, causing sulfur droplets to form nodules. A vibrating screen separates about one-third the sulfur as oversize lumps of 92-95% purity. These lumps go directly to the melting tank.

5. Smaller material undergoes froth flotation, in which semi-purified (80-95%) sulfur is removed as flotation concentrate. Flotation is carried out at 3.0 pH and 140-195° F.

6. Semi-purified sulfur is dewatered and melted.

7. Molten sulfur is filtered in a steam-heated leaf filter. Cake is returned to the slurrying step for reworking. The filtrate is 99-100% pure sulfur.

The process extracts substantially all the sulfur from the ore. A single cycle gives 90% recovery or better. Ore containing as little as 20% sulfur can be processed economically. In fact, ore with

over 30% free sulfur can be processed at a net cost of $15 to $18 per ton of sulfur at U. S. labor and materials prices.

The process is applicable to vast supplies of ore all over the world. These deposits, which can be mined from the surface, are in South America, Egypt, Greece, Turkey, Japan, India, and western U. S. South American deposits are the largest known, stretching 3,000 miles and estimated to contain upward of 100-million tons of elemental sulfur.—Chem Eng, Mar, p128

Continuous Butter Making Raises Output, Lowers Cost

Switching from batch to continuous processing for making butter has increased production by 12½%, saved labor (70%) and floor space (70%), and given a more uniform product for Frank Pilley & Sons, Inc.

The over-all process consists of:

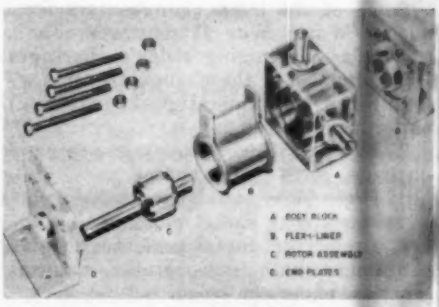
1. Cream receiving and grading.
2. Conditioning by cooling in 1,000-gal. vats and filtering through stainless-steel pressure filter to remove coarse suspended solids.
3. Concentrating by forcing cream through high-velocity centrifugal stabilizing unit. Then it is heated to 130° F. and passed through separator to emerge with 88–90% fat content.
4. Pasteurizing in a Vacreator vacuum pasteurizer at 200° F. and cooling by evaporation to 110° F.
5. Standardizing fat, pH, flavor, moisture, salt, and color.
6. Chilling in two continuous units, each with a rated capacity of 2,000 lb. of butter per hr.
7. Working in Texturators, in which it is subjected to a mechanical treatment similar to that of a churn. Most working action is obtained by forcing the butter through a perforated plate at the discharge end.
8. Packing for storage or molding into units.—Food Eng, Apr, p98

Compressed Air Snakes Line

Snaking a line in a 300-ft. run of 1-in. underground conduit in less than 1 min. is quite a job. But Kuster-Wetzel Electric Co. did it at the Lakewood Park housing project near Los Angles.

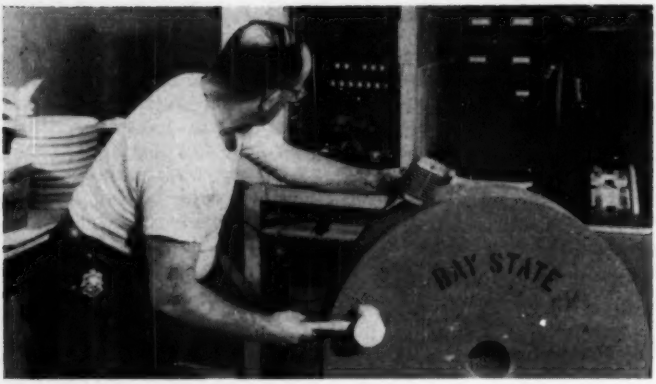
A special coupling was made through which a fish line could be fed and to which a standard compressor hose connection could be coupled. To the top of a standard Y-coupling was fastened the compressed-air control valve, and to the bottom an extension length of 1-in. conduit to couple to the underground conduit stub.

The fish line (¼-in. rope) was fed in the side of the Y-coupling through a special Monel-metal split sleeve. The operator then would blow the dirt out of the conduit with a blast of compressed air, blow a rag through as a swab, and then fasten another rag to the end of the line and blow it through with the line.—Elec C&M, Apr, p129



THIS IS A MECHANICAL HEART

To go along with a mechanical kidney (McG-H Digest, June '50, p30) medicine now has a mechanical heart. In use, blood is detoured from the human heart through vinyl tubes into an artificial lung (not shown), thence to the pump. Key elements of the pump are a Flex-i-liner squeegee pressure unit and an eccentric rotor. Rotation of the eccentric rotor develops squeegee action between the outer surface of the rotor and inner wall of the housing. Thus, blood is pumped along arteries of the body.—Mod Plastics, Apr, p166



WHEEL GRADING BY SOUND

Strobscopic frequency meter detects cracks in grinding wheels at Bay State Abrasive Products Co. Wheel is struck with a mallet. Resulting ringing sound is picked up by microphone, amplified, and fed to neon flashing tube. Twelve rotating disks are thus illuminated, and frequency is used as criterion of quality.—Electronics, Apr, p115

Packaging Substitutes for Hard-To-Get Materials

Packaging materials—metal, metal foil, cellophane, and plastics—may soon become hard to obtain for packaging civilian goods.

Some of the basic change-overs made during World War II may serve as a guide for overcoming today's shortages. Here is a list of the change-overs:

1. From rigid metal packages to all-paper packages.
2. From rigid metal packages to paper packages with metal ends.
3. From rigid metal packages to glass containers with metal closures.
4. From rigid metal packages to glass containers with non-metallic closures: plastics, paper, or wood.
5. From metal-end paper packages to all-paper packages.
6. From flexible aluminum-foil packages to all-paper packages.
7. From molded plastic containers to glass containers.
8. From rigid transparent plastic packages to paper packages.
9. From plastic film packages to all-paper packages.
10. From cellophane packages to all-paper packages.
11. From textile bags to paper bags and the various laminated combinations of paper.
12. From nailed-wooden shipping cases to all-paper shippers.

Glass and paper are the most important substitutes. Each manufacturer must study the package substitutes for his own particular products.—Mod Packaging, Feb, p77

Supplements Food Icing

Fumaric acid and sodium benzoate make up a new preservative, called Fran-Kem, that supplements icing of fish or other fresh foods during shipping and storage. Manufacturer is Washington Laboratories, Inc.

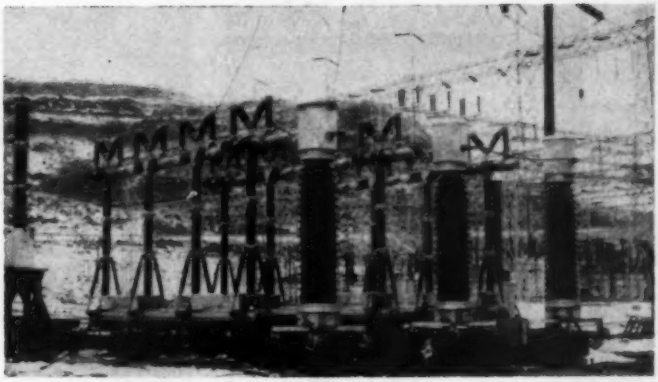
The preservative is a powder used in the ice aboard a fishing vessel, in cooking water for crabs or shrimps, or as a dip for vegetables and fruits. It also can be dissolved in water for making ice.

The compound halts enzymatic, oxidative and bacterial changes. In a recent test, halibut preserved in Fran-Kem ice graded No. 1 in 16 days after catching, while fish held in ordinary ice on the same boat graded No. 2 in 6 days.

A definite advantage of Fran-Kem ice is that it need never be chipped out.—Chem Ind Wk, Mar 17, p29

CAN INTERRUPT 11-MILLION KVA.

Tests on 220-kv. Brown-Boveri airblast circuit breaker have proved it capable of interrupting, in 2½ cycles, faults up to 11-million kva., three-phase equivalent — a value never before approached by air-breakers. Breaker has no disconnect. It is to be installed by Bonneville Power Administration. —Elec World, Mar 26, p95



Continuous Treating Unit Sets Yarn Permanently

A yarn-treating machine installed at Electric Hose & Rubber Co. takes 50 ends of yarn from a creel, passes them through an adhesive impregnating bath, stretches them under controlled tension, oven-dries them, and winds them in 50 uniform packages—all automatically and on a three-shift basis.

An impregnator section applies chemicals to the cord as it enters the machine. Two rubber rolls reciprocating in opposite directions across the face of a third rubber roll insure saturation of the components.

After a second immersion, the cord passes through a final set of pneumatically controlled squeeze rolls that regulate the amount of chemical pickup.

In a second unit—the oven—chemicals are cured on the cord, and the cord is dried or heat-set. The oven is of the balanced heat-exchanger type, wherein recirculated air is the drying medium. Processing thermosetting and plastic resins is speeded in the oven by two unobstructed 10-yd. passes.

The third unit is a 52-spindle drum-type winder, complete with ribbon breaker. It incorporates adjustments for variables, such as cord size and coefficient of friction. The winder produces random-wound cheeses that are 8-in. wide and 12-in. in dia.

While the machine was developed by Walter Kidde & Co. originally for the purpose of bonding cotton-yarn fibers, it has proved successful for treating synthetic fibers and yarns.—Textile World, Mar, p132

Truck Brings Brine to Plant

Texas Brine Corp. sells brine to many industries in many places. When customers are too far from its Houston headquarters, shipping is costly. So TBC engineers have designed a portable brine maker that takes the salt right to the customer and makes the brine there.

A dissolving tank, brine filter chamber, and pumps and piping are all mounted on a tandem trailer. Each truck has a maximum capacity of 20 tons of salt.

The customer's water line is tied to the brine maker. Water comes into the dissolver under pressure and flows up through the salt particles. Valves equalize water flow for good distribution. In 3½ hr., the machine produces 13,846 gal. of solution, which contains 18 tons of salt.—Business Wk, Mar 31, p56

FRIGIDAIRE INTRODUCES UNUSUAL APPLIANCES

Models RO-60 and RO-50 electric ranges, made by Frigidaire Div. of General Motors Corp., feature the Wonder Oven. Movable unit can convert single large oven into two separate compartments, providing upper oven with two heating units for broiling, baking, or roasting and lower oven for baking or roasting. When upper oven is used for broiling and door is left ajar, separate sliding door closes off lower oven.

Imperial 10-100 refrigerator is a two-door, 10-cu. ft. model that provides three kinds of cold, each with its own refrigeration system operated by single compressor. One is sub-zero cold in top compartment. Second is dry cold in large compartment; a Refrig-O-Plate located in back wall collects moisture from air, automatically defrosts. Third is moist cold in vegetable crispers.—Elec Merch, Apr, p131

Barrel Factory on Wheels

A completely self-sufficient mobile factory, built by the Van Leer Group, Holland, manufactures steel drums (for oil, paint, etc.).

The factory consists of six trailer units—two lines of three each drawn up side by side. The adjacent sides of the trailers are lowered and meet to form a floor. An awning forms the roof.

All machines and processing equipment are permanently attached to the trailers—set up to form a regular production line. The process for making the drums is the same as in any stationary plant. Output with ten operators is 1,000 drums per 8-hr. shift. In a demonstration, drums—painted, dried, and tested—began coming off the line only 19 min. after the six trailers were in position.

Other units make the factory self-sufficient. A 200-kva. diesel generator plant supplies power. A tank truck carries fuel oil and water. Living and sleeping accommodations, a restaurant, and even a movie theater on wheels complete the convoy.

Van Leer Group uses it to supplement the output of its stationary factories in an emergency. The mobile factory can also be used to an advantage in remote locations.—Factory, Part 1, Apr, p176

How To Save Scarce Materials

As material shortages pinch and squeeze industrial output more and more, here are ideas you can use to keep your production curve up

U. S. INDUSTRY is keeping production high by conserving scarce materials. Industry is avoiding many critical shortages by redesigning products and by substituting domestic materials for imports, non-metals for metals, abundant metals for scarce ones.

One television maker redesigned his set, cut out 12 lb. of critical materials. If every television receiver made in 1950 had been like the new one, the industry would have saved 440 tons of cobalt, 2,100 tons of aluminum, 4,600 tons of copper, and 224 tons of nickel.

Research is Necessary

Finding substitutes is not easy. A particular material may substitute in one application but not in another—plastics replace tin in cans, for instance, but not in solder. So intensive research must go into each potential saving. Costly retooling is often necessary.

But big savings have already been made. And still more substitute materials are being developed.

The case of columbium shows what can be done. It is scarce, and vital for defense products—notably jet engines. In some cases, industry can substitute tantalum steel or a cobalt-base alloy of nickel and chromium. But these metals are scarce, too. So laboratories are working on ceramic-metal combinations.

Plastics Replace Metals

Plastics can replace metals in small parts that do not get too much wear. Reinforced plastics, strengthened with fibrous glass or other materials, have great strength and flexibility.

Wood is a good metal-substitute. One maker of room-cooling equipment designed his cabinets to use wood or either one of two metals. Now he can switch back and forth, use whichever is available. Glass, which has cheap and plentiful ingredients, is becoming more popular.

Industry uses common metals to save scarce ones. A well known example is shell cases made of steel instead of brass. Magnesium alloys sometimes substitute for zinc, aluminum, and steel. Magnesium instead of cerium can be used in making nodular iron.

Substitution is not limited to metals. Synthetic-rubber production is increasing fast, will soon reach 950,000 tons a year. Steady improvement in quality is making synthetic a better substitute for natural rubber.

New synthetic fibers substitute for wool. Capacity will be doubled by sometime in 1952—to about 60-million lb. a year—with more planned.

Substitutes For Farm Products

U. S. Department of Agriculture is pushing output of substitutes for imported agricultural products. Domestic castor beans are expected to meet one-third of U. S. needs in 1952. Production of tung oil is increasing in the U.S. and South America. Output of abaca is rising on Central American plantations backed by the U. S. Reconstruction Finance Corp.

Kenaf has been developed as a superior substitute for jute. Planting is speeding up in Cuba. Experts claim that Cuban kenaf can supply 30–50% of U. S. needs for burlap within 1 or 2 years.

Some of these substitutes will be dropped in the long run—those that are either too costly or inferior to the materials they replace. But others have promising futures.

1951 World Motor Census

Total automobile production for 1950, according to the *American Automobile (Overseas Edition)* survey, was 10,462,425 units. That is the first time output went over 10-million. Other features of the census: 20,637,255 vehicles operating in countries outside the U. S.; total for all countries is 68,695,200. Overseas total (including estimate of U. S. S. R. vehicles) for trucks and buses, 9,305,438, is nearly equal to the total of cars 11,645,245. U. S. total for trucks and buses is 8,415,070. Car total is 39,642,875.

Rate of replacement was higher elsewhere in the world than in the U. S. Interruption of producing during World War II caused middle-aged (5-8 year old) automobiles to disappear from the roads. Number of automobile assembly plants located outside the prime manufacturing countries has increased. Reprints of the census are available.—Am Auto, Apr, p33

Low-Quantity Salt Plant

Small packaged salt plant, developed by Manistee Iron Works Co., employs radically improved methods of heat recovery. It can produce as little as ½–2½ tons per hr. of refined crystalline sodium chloride. A conventional multi-effect steam plant rarely produces less than 2½ tons per hr.

The new plant can easily be set up in remote areas because of its compactness. A 1-ton plant requires only 2,000 sq. ft. —a reduction of 75% or more from the area required for a conventional plant. Such a plant would cost from $150,000 to $175,000 and need only two men to run it.

The big market will probably be overseas. Two plants are being built in South America—one in Caracas, the other in Rio de Janeiro.

In most installations, crude salt is redissolved to make a brine from which salt is produced.—Chem Eng, Apr, p74

House Needs No Utilities

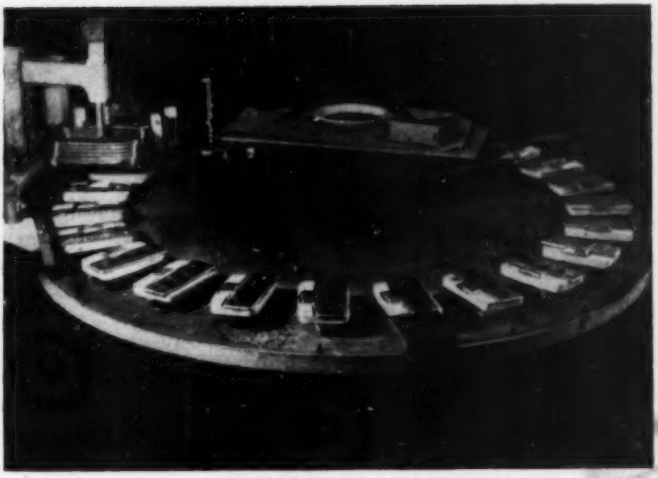
A Massachusetts Institute of Technology student has designed a unit that will make a house completely independent of waterpipes, gas mains, and electric power lines. Running on fuel from a supply tank, the unit generates electricity for heat and light. In addition it contains a purification unit to which all waste water from baths, toilets, or garbage disposal is directed. Here the impurities are removed and left behind as solid matter while the water is returned to the system for reuse.—Eng News-Rec, Apr 5, p52

HOW TO RAISE FLOOR TRAFFIC

Clever promotion idea in Barker Bros. store in Los Angeles increased its floor traffic 1,000% over normal Saturday traffic in its electric housewares department. Idea was "Kid's Day". Eight teen-age boys were selected from high schools to be "salesmen for a day". Customers voted for "best salesman", who received a scholarship-fund award.—Elec Merch, Mar, p51

INDUCTION HEAT SOLDERS AL

Aluminum soldering requires close temperature control, which is possible with induction heating. Such heating at 450-kc. also avoids distortion in 2S alloys when aluminum nameplate and brass studs are soldered together. The 24-station assembly rotates under two heating coils. Production rate is 320 per hr. Soldering temperature is 1000° F.—Iron Age, Mar 15, p108



Veneer-Peeling Lathe Speed Controlled by Electronics

Motor-speed variation is essential in cutting hard- and soft-wood veneers used in making plywood. When the log is large at the start of the operation, lathe speed must be low. As the log gets smaller, a higher speed is necessary to maintain a reasonable production rate.

An electronic control has been developed by General Electric Co., Ltd. of England. The system works by comparing the voltage output of one of two tachometer generators with a standard reference voltage. Difference voltage then corrects speed error.

One tachometer generator, driven by main driving motor, controls lathe revolution by presetting spindle speed. Second one, driven from log-driving roller, controls constant peeling rate. Standard voltage is derived by a potentiometer.

Difference voltage is fed to an amplifier. Tube anodes in output stage are joined by two relays that are caused to operate by an incoming signal. Relays control contacts that close pilot contactors of the appropriate motor-operated poteniometer, thereby varying either field or armature supply of the main driving motor and opposing the speed fluctuation that caused the original signal.—Electronics, Apr, p136

Aero Problem Slide Rule

Douglas Aircraft Co.'s testing division engineers have developed a new slide rule for on-the-spot answers to common aeronautical problems.

Perfected as an aid for engineers and pilots, the rule carries conventional A, C, and D scales and 20 other computing arrangements peculiar to aviation. It permits determination at a glance of the Mach number, true and indicated airspeeds, density, altitude, temperature rise, and many other aeronautical functions.

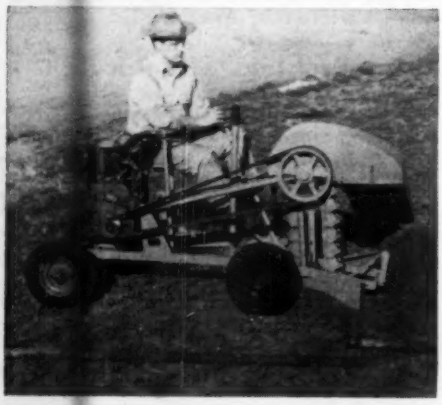
Performance may be calculated in miles per hour or knots without reference to conversion tables. For quick conversations, there are scales for Centigrade-Fahrenheit and mph.-knots relationships. Also, there are several relationships in the English and Metric systems.—Aviation Wk, Mar 19, p36

NEW EQUIPMENT...

Platform Beam Scale—Load King scale, with capacities up to 6,400 lb., is intended primarily for heavy-duty industrial applications where shock loading is the rule. Lever system and other key parts are made of steel. Pit requirements for the scale are 11 in.—**Yale & Towne Mfg. Co.**—Iron Age, Mar, p35

Water without Bugs—Santophen 45 is an effective and cheap agent for combatting bacterial and algal growth wherever large amounts of cooling water are used. It can be used alone or with other chemical agents.—**Monsanto Chemical Co.**—Business Wk, Mar 31, p61

Combines Form and Reinforcement—Unit combines deep-corrugated high-strength galvanized steel and transverse welded reinforcement. It serves as a permanent form and reinforcement for concrete floors. —**Granco Steel Products Co.**—Const Meth & Equip, Apr, p108



TRENCHER SAVES TIME, MONEY

Time study on mechanical ditching with 6-hp. Ditch Witch, made by Charles Machine Works, showed trenching rate of 800 ft. per day for 4½x24-in. trench. Cost was 2½¢ per ft., compared with 20¢ per ft. for hand digging. Machine weighs only 550 lb. and can be moved on small trailer or pick-up truck.—Elec C&M, Mar, p69

Turbine-generator—WA-series steam turbine-generators, available in ratings of 500-7,500 kw., have economical regenerative feedwater heating cycles. They can also be tied in thermodynamically to provide steam-power balance where low-pressure process steam is needed. Characteristics permit paralleling with existing unit. —**Allis-Chalmers Mfg. Co.**—Power, Apr, p162

Regulating Valves—Flow regulating valves are designed to handle steam and water at high pressure drops, and especially flashing condensate. Direct impingement is eliminated and effects of corrosion and erosion are reduced.—**Swartwout Co.**—Chem Eng, Mar, p145

Precision Bushings—Lightweight and uniform size of bushings preserve the balance of grinding wheels. Press-fit mounting insures greater holding power of the bushing within the wheel.—**Norton Co.**—Ind Dist, Apr, p125

Line Lubricator—Micro-Fog lubricator breaks oil down into particles 2 microns in dia. and distributes them over several outlets. Oil can be metered to as little as one drop per 20 min. if desired. Range is 1 cfm. at 10 psi. up to 14 cfm. at 80 psi.—**C. A. Norgren Co.**—Am Mach, Apr 2, p144

Tests Metal Hardness—Direct on-the-job reading of metal hardness can be made quickly with this portable hardness tester. Depression of steel or diamond point forces liquid in a small chamber up into a transparent tube containing a calibrated scale. Almost all shapes and forms of metal can be tested.—**Newage International, Inc.**—Aviation Wk, Mar 19, p59

Coating Resins—Expected uses for new silicone-alkyd resins—Plaskon ST-856, ST-873, and ST-881—include coatings for transformers, motors, space heaters, transmission towers. First two maintain gloss and color at 400-500° F. ST-881 for aluminum maintains film properties at temperatures over 1500° F.—**Libbey-Owens-Ford Glass Co.**—Elec World, Mar 26, p148

. . . AND MATERIALS

Removes Liquids—Vape-Sorber is installed in air or gas lines to instruments and critical pneumatic operations where oily air has detrimental effects. Device also removes water, free oil, water-oil emulsion, and dirt. Ceramic filters and activated carbon do the job.—**Selas Corp. of America**—Oil & Gas J, Mar 15, p107

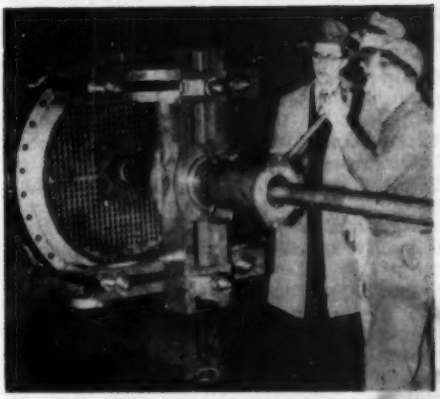
Reinforcing Membrane—Asphalt-treated Fiberglas fabric adds high-tensile-strength reinforcing to emulsion and cutback asphalt coatings. It is used with asphalt coatings in waterproofing applications, roofing maintenance, and tank and pipe protection.—**Flintkote Co.**—Factory, Part 1, Apr, p136

Concrete Tamping Machine—Gasoline-powered tool "walks" across screeded concrete, tamping with an even pressure as it moves. Positive action forces aggregate down, eliminating work-up of particles. Unit is powered by ¾-hp. engine.—**Clement Mfg. Co.**—Eng News-Rec, Apr 12, p125

Circuit Converter—Multi-pole circuit converter, measuring 2¾x2¾-in., provides instant conversion without additional parts because of reversible contacts. Unit is produced in two to eight pole types for 6-600 v. ac. and 6-230 v. dc.—**Arrow-Hart & Hegeman Electric Co.**—Elec Whols, Mar, p75

Tandem-unit Waste Machine—New machine accomplishes the same hard-waste processing in a single passage as an ordinary four-cylinder waste machine. Two opening actions take place on each cylinder of the machine.—**Kirkman & Dixon Machine Shop & Foundry**—Textile World, Apr, p129

Hydraulic Testing Machine—Simplified and accurate tension, compression, transverse and flexure testing is possible with new low-cost machine. Indicating system allows a 50-1 spread of testing ranges on one dial. Test ranges can be changed during operation.—**Tinius Olsen Testing Machine Co.**—Mod Plastics, Apr, p144



REMOVES TUBE BUNDLE

Bundles in shell and tube heat exchangers may be removed by the jack pictured above. The M. W. Kellogg Co. designed it to save construction costs of heat exchangers supported above ground. Conventional pulling beams and related structures are eliminated. The bundle remover may also permit a more compact general plant layout and thus a smaller plot.—Chem Eng, Mar, p161

Latex "Chamois"—X-Lint, a non-woven fabric impregnated with Hycar latex, looks, feels, and absorbs water like chamois. It is unaffected by household chemicals and solvents, and is impervious to salt water. It wears three times as long as chamois and costs one-third as much.—**B. F. Goodrich Chemical Co.**—Fleet Owner, Apr, p67

Polyethylene Bottle—Unbreakable 32-oz. bottle is suitable for packaging corrosive liquids. Bottle is threaded to accommodate standard 38-mm. acid pour-out caps. Other closures are available on special order.—**Plax Corp.**—Mod Packaging, Mar, p126

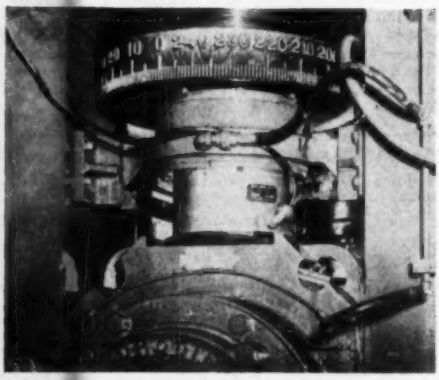
Controls Plant Pests—Insecticide controls such pests as black spot, mildew, rose chafer, and aphids on flowers. It is green, allowing residues to blend with natural foliage, and may be applied either as dust or spray.—**Food Machinery & Chemical Corp.**—Hardware Age, Apr 5, p84

NEW EQUIPMENT (Cont.)

Cuts Odd Shapes—New Campbell nibbling machines cut odd shapes of ferrous and nonferrous metals. Work can be fed in any direction. Five models have throat depths from 24-36 in. and capacities from ¼-½ in. of low-carbon steel.—**American Chain & Cable Co., Inc.**—Steel, Apr 2, p139

Fast Steamer—Controlled recirculation of boiler water gives a heat-transfer rate in CE Re-circulation Steam Generator that produces three or four times as much steam as conventional boiler of same size. Capacity is 6,000 lb. per hr. at pressures up to 300 psi.—**Combustion Engineering-Superheater, Inc.**—Power, Apr, p158

Eliminates Odors—Non-toxic and highly concentrated deodorant eliminates objectionable amine and sulfite odors in mills and yarn-producing plants. Only 40 cc. of deodorant per ton of fabric or fiber is required to eliminate odors.—**Phillips Scientific Lab.**—Textile World, Apr, p140



CHECKS ROLLING-MILL LOAD

Aluminum Co. of America has installed Baldwin SR-4 strain gages on a cold-roll strip mill. Gages are bonded to short steel columns just above the roll. They indicate roll loads continuously, making it possible to adjust roll load and control thickness during actual rolling. Gages are actuated when compression of the column changes electrical resistance of the grid wires in each gage.—Iron Age, Mar 22, p74

Proportioning Pump—Designed for laboratory and small pilot-plant work, this unit is a combination of six separate pumps operated by a single 1/20-hp. motor. Capacity of each separate pump is 1-500 cc. per min. Regulated flow can be obtained from any single pump, and one to six separate liquids can be delivered simultaneously in desired proportions.—**Brosites Machine Co.**—Chem Eng, Mar, p148

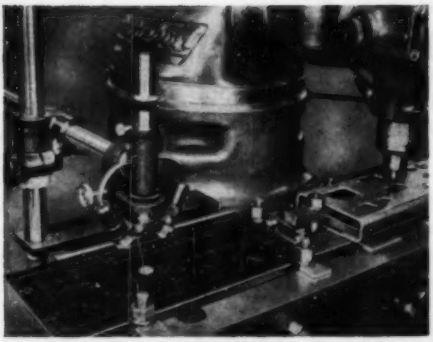
Patches Concrete Floors—Resurfacing material contains aggregate claimed to be effective as over-all floor resurfacer and small-crack filler. It is a powder made up of metal grains and four types of aggregate. Mixed with water, it is applied in much the same way as concrete.—**Monroe Co.**—Foundry, Apr, p251

Oil-well Rig—Type 75-CA rig is designed for 650 input hp. and is for drilling to 6,500-9,500 ft. Air controls all major operations of rig, including catheads, drive-group engine throttles and clutches, master clutch, inertia brake, and pump drive clutches.—**National Supply Co.**—Oil & Gas J, Mar 1, p89

Lift-truck Drum Clamp—Rubber-faced grab plates and horizontally adjustable forks are combined to make a clamp for handling cylindrical objects. Forks move simultaneously either in or out by means of separate hydraulic cylinders. Cardboard drums can be handled without crushing.—**Baker-Raulang Co.**—Railway Age, Mar 26, p48

Electronics Control Miller—No. 4 heavy-duty vertical milling machine features electronic control for all feeds. Master control station contains spindle start, stop and jog pushbuttons; table and slide speed controls; selector switch for two slides; and emergency stop button.—**Reed-Prentice Corp.**—Am Mach, Apr 2, p142

Miniature Motor—Type J49D-16 motor, developed primarily for manufacturers of aviation equipment, is rated at 1/50 hp., 0.25 amp., and 10,000 rpm. It weighs 10 oz. and is 1¾ in. in diam. and 7⅞ in. long. It operates from 3-phase, 200-v., 400-c. source.—**Eastern Air Devices, Inc.**—Electronics, Mar, p268



OPTICAL DUPLICATOR

Precision hole spacer on knee-type milling machine is simple with an optical follower duplicating instrument made by Boeckeler Instrument Co. Accurately laid-out templet, showing hole locations, is fastened to machine table. Motion of table is guided by operator following templet lines with microscope. Accuracy is 0.0002 in.—Steel, Apr 2, p88

Induction Regulator—Both self-cooled and forced-air-cooled regulators are included in new line of three-phase, dry-type, induction voltage regulators. Ratings are 120-600 v., 12-85 kva., in 10 and 20% ranges of regulation.—**General Electric Co.**—Elec World, Apr 9, p146

Power Wheelbarrow—Self-powered wheelbarrow will pull a full load up a 40% grade. Compression acts as brake on downgrade. Machine eliminates most of effort, rather than speeding operation.—**S and S Vending Machine Co.**—Am Builder, Apr, p190

Hydraulic Punch—Hand-operated hydraulic-pump arrangement allows hole punching in sheet metal with little effort. A small hydraulic piston on the tool forces cutter through metal.—**Patterson Equipment Co.**—Business Wk, Mar 24, p116

Portable Lift Truck—Truck will lift or lower heavy loads around the shop. Makers recommend it for positioning castings in machining operations. Two models are available with hydraulic lift powered by hand or electric motor.—**Ginsberg Machine Co., Inc.**—Factory, Part 1, Apr, p97

Lowers Starting Load—Delayed starting control on PAR Model 100 two-motor air compressor makes savings possible in starting amperage and extra wiring. Second motor is started 10 sec. after first, thus reducing electrical load required by starting both at same time.—**Lynch Corp.**—Food Eng, Apr, p137

Separates Steel Sheets—Non-electric, permanent-magnet sheet separator speeds up sheet handling by inducing a magnetic field in sheets so they repel each other. The ends float with air space between them, allowing worker to grasp top sheet easily and feed it into press.—**Verson Allsteel Press Co.**—Iron Age, Mar 1, p38

Flame-cuts Smooth Edges—Flame-cutting device makes exceptionally clean-cut accurate edges on metal plates. It cuts single or double bevels, with or without a land. Any gas-cutting machine equipped with 3-in. square torch bar will take device.—**Air Reduction Sales Co.**—Weld Eng, Mar, p45

Pulps Paper—Slush-Maker pulper is claimed to give complete defibering of high wet-strength papers without damaging the fibers. Reason is handwheel controlled setting of disintegrator-rotor bars at various distances from attritioning-ring bars.—**Morden Machines Co.**—Paper Ind, Mar, p1352

Combination Fixture—Directoray is a unit combining suspension radiant heater and fluorescent light fixture. Heating panels of glass with aluminum grids extend out at an angle from fixture body carrying the tubes. Power rating is 1,500 w. Heat rating is 5,100 Btu.—**Salton Mfg. Co., Inc.**—Elec C&M, Mar, p101

READER SERVICE

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Camera Sees Like Moving Eye

Scanning prism sweeps wide field of view into the fixed lens and onto film strip a mile long. Pennsylvania state is covered in one day

GIANT AERIAL CAMERA "radically" different from its predecessors and capable of performing tasks previously requiring the use of a battery of cameras has been developed for the U. S. Air Force by the Perkin-Elmer Corp.

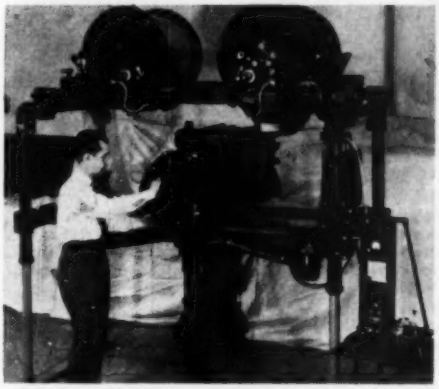
The camera, designed for photo reconnaisance, has a lens of high resolution. Pictures have high clarity, but there is slight distortion. So the camera is not intended for mapping purposes. Its primary mission: the filming of great land masses with greater speed, economy, and efficiency than possible heretofore.

Carried in a plane at 40,000 ft., the camera could photograph in sharp detail the entire state of Pennsylvania in less than 1 day on one roll of film. At this altitude, railroad ties and shadows of telephone poles show up separately and clearly. The camera's huge spools carry film 1½ ft. wide and about a mile in length.

The camera does not move. Its lens has a narrow field of view. But still it can photograph through an extremely wide angle—up to 180° of terrain, on a single unbroken strip of film. This compares to angular coverage of only 38° attained with two 40-in. lens cameras now used.

The instrument, actually a strip camera, films across the line of flight, instead of along the flight path. It uses only one roll of film. In place of 40-in. lenses now commonly used by the Air Force for panoramic photography, the camera is equipped with an extra large 48-in. lens with an opening of f/8. It weighs about one-third of a battery of cameras capable of preforming a similar task.

A wide field of view is covered with a lens that is fixed and has a narrow field of view by means of a huge scanning prism. The prism mirrors into the lens a sweep of terrain stretching far beyond the lens' field of view.



UNIQUE CAMERA films great land masses with great speed, economy, and efficiency

The scanning prism, pivoted at the bottom of the camera and hanging in a three-section window in the belly of the plane, sweeps the terrain below in a stroke that starts at the horizon off one wingtip and follows through to the horizon off the opposite wing. The ground image is fed into the lens and "wiped" onto film moving in exact synchronization with the moving prism.

This arrangement produces a long, narrow picture showing terrain through an angle 20° fore and aft of the plane and 180° laterally. After a sweep, which is always in the same direction, both prism and film automatically stop for a short period, allowing the plane to move forward for another picture.

The scanning prism automatically repeats the scan. Pictures overlap to give

a continuous scene along the line of flight and to permit stereoscopic study of ground objects.

Each scan produces pictures 2-12 ft. long, depending on altitude and other factors. Only a 2-in. length of film is exposed at any instant in operation of the camera. Each picture is separated from the next one by a narrow 2-in. margin. There is no film waste.—Aviation Wk, Mar 26, p32

More Mills Cut Slip Loss

The question of how many mills to have comes up frequently in porcelain enameling plants. While it is not possible to have a mill for every color, there should be enough mills so washing out of mills is reduced to a minimum. Time, material, and labor are wasted in changing from one enamel to another.

One plant found that 1¼-1½% less slip is dumped from a mill than is actually charged as raw materials. This meant that much loss would occur every time color or type of enamel was changed.

The loss in 1 year was computed to cost more than an extra mill. So two mills were bought; they paid for themselves in less than 2 years.—Ceramic Ind, Mar, p73

Two-Way Radio Kept Busy

Two-way radio at the Bayonne refinery of Tide Water Associated Oil Co. has increased the efficiency of its mobile units, such as trucks. But more uses have developed.

Radio, for example, has replaced hand signals on such jobs as pulling cable by small tractors. Another use has been by pipefitters engaged in locating and identifying pipe lines. Still another is the adjusting of remote-control valves.

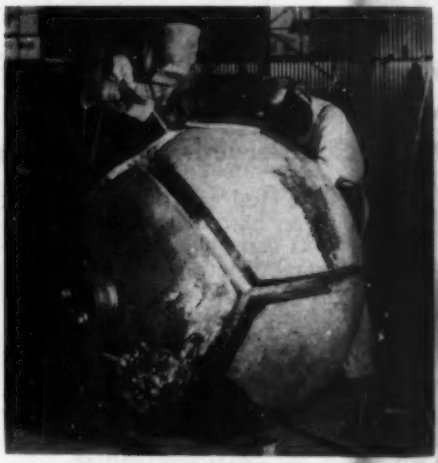
A third important application is in rigging operations where the crane operator gets instructions direct from the foreman and yet is not in line of sight. —Oil & Gas J, Mar 29, p236

Adobe Blocks for Homes

Lloyd G. Clark of Studio City, Calif., is specializing in adobe blocks for home building. Except for scientific determination of proportions of sand and clay and water-proofing with an asphalt emulsion, they are made in much the same way as the Indians made them centuries ago.

Ideal soil for making the blocks is 70% sand, 30% clay. Cement mortar is used in joining the blocks. A sealer coat of asphalt paint is applied with final coats of lead or oil paint. No waterproofing is needed.

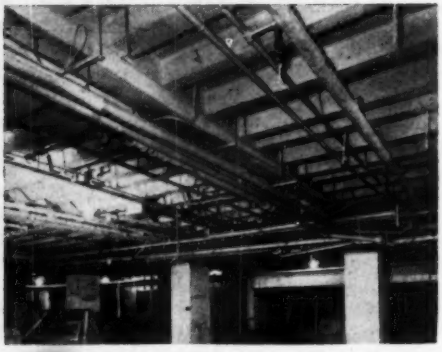
Advantages cited by Clark: (1) the adobe gives perfect thermal insulation; (2) it is fireproof, termite- and vermin-proof, and earthquake resistant; (3) no maintenance is required; (4) it is plentiful and not a critical material; and (5) it is cheap.—Am Builder, Apr, p169



STORES LIQUID NITROGEN

Unique high-strength pressure vessel will store liquid nitrogen at 5,500 psi. and —340° F. Research Welding & Engrg. Co. welded it of six 3 11/16-in. stainless-steel plates. All welds were inspected by Dy-Chek, a dye penetrant method (McG-H Digest, Oct '50, p46). The vessel will be used by the U. S. Air Force in rocket-propelled aircraft experiments.—Chem Ind Wk, Mar 24, p28

From Ugly Pipes . . .



BEFORE—Installation view shows a maze of pipes, ducts, sprinkler runs, and conduit beneath concrete beams at May Co.'s Los Angeles store. Lamp channel strips (Sylvania, C-80 and C-150) have been installed, and hanger straps to support louvered sections are in place. Area to be lighted is 4,000 sq. ft.

. . . to Beautiful Ceiling

AFTER—Completed installation is a beautiful louvered ceiling. Lighting load of 23 kw. with 180 fluorescent lamps gives average illumination of 77 ft.-c. on clothing racks. Louvers measure 32 by 32 in. with 3-in. square cells. Top edges of louvers and carpet are green to give psychological cool environment.—Elec C&M, Apr, p189

Turbine Castings Repaired with Submerged-Arc Welding

Repairing of steel castings, particularly high-pressure, high-temperature turbine castings, has been improved and speeded up at General Electric Everett (Mass.) plant by reducing the number of work stations from ten to seven. They are:

1. Preliminary over-all 100% magnetic test by dry-magnetic-powder prod testing equipment.

2. Casting preheat in annealing furnaces to temperatures of 100–600° F., depending on metal composition.

3. Casting repair by semiautomatic submerged-arc welding with the preheat temperatures maintained by multiple-jet gas heating pipes placed inside casting. Defects are flame-gouged before welding. Manual welding is done where semiautomatic welding is impracticable.

4. Stress relief anneal in car bottom annealing furnaces—heating to 1200° F., holding 1 hr. per in. of section thickness, furnace cooling to 450° F.

5. Pressure clean to remove annealing scale and weld spatter.

6. Chipping and grinding of welds and cleaning of inaccessible internal steam passages.

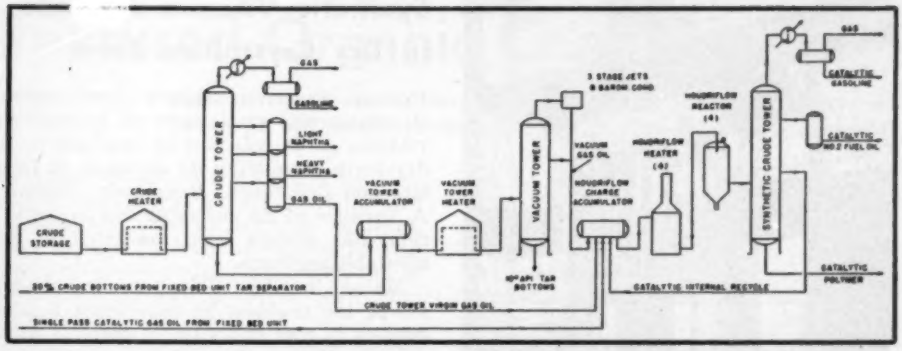
7. Final over-all 100% magnetic test. —Weld Eng, Apr, p26

Black-Light Techniques

Black light, invisible ultra-violet ray, has been adopted by two aircraft manufacturers in novel techniques.

In Lockheed Aircraft Corp.'s application, fluorescent powder is added to standard or test fuels; then the engine is run long enough to get full circulation of the fuel through the system. Any fuel seepage through leaks will deposit small amounts of the powder at the leaks. Ultra-violet light then pinpoints these leaks with brilliant fluorescence.

North American Aviation flanks a



***FLOW DIAGRAM** of crude, vacuum and catalytic sections of Sun Oil Co.'s Toledo refinery shows how new facilities were integrated with existing facilities and the feasibility of . . .*

conveyor system with two banks of 100-watt ultra-violet lamps. Plastic parts move along the conveyor for curing. This technique so far has been limited to polystyrene plastics using light-sensitive catalysts—usually benzoin—for ultra-violet response. Curing times have been reduced in this way from 8 hr. to 2 hr.—Aviation Wk, Mar 10, p47

Condenser-Tube Failures

When condenser tubes in the same area fail repeatedly from erosion and corrosion, hydraulics of the condenser system is often the cause of the trouble. If local water-air conditions could be changed, not only would failures decrease but cheaper alloys would be suitable.

These points should be considered: (1) Turbulent water flow favors erosion and corrosion; large air bubbles accelerate tube damage. (2) Non-uniform velocity produces turbulent flow, the two being proportional. (3) Increase in water velocity decreases pressure and releases air from solution as bubbles. (4) Center of a free vortex is a low-pressure region in which a "ribbon" of air usually forms. (5) In case of leaks, free air enters the system where water pressure is less than atmospheric.—Power, Mar, p122

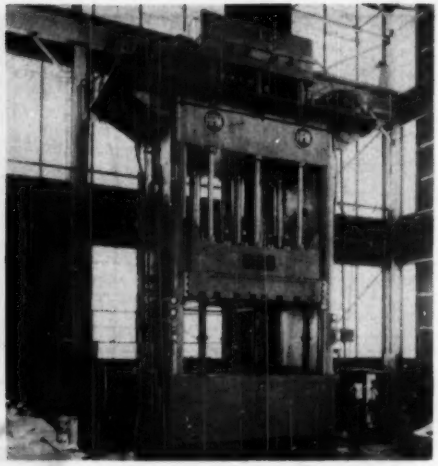
Adapting Houdriflow Process to Modernizing Older Plant

Major refinery addition at Sun Oil Co.'s Toledo refinery required integrating the design with existing plant facilities. Result was a combination crude-vacuum catalytic cracking plant.

This plant includes (1) a 30,000-bbl.-per-day crude unit, producing gasoline, naphtha, kerosene, gas oil, and 30% reduced crude; (2) a vacuum unit, charging crude from new crude unit and tar bottoms from existing fixed-bed cracker; (3) catalytic cracking unit, charging light gas oil from the crude unit, heavy gas oil from the vacuum unit, cracked light fuel from fixed-bed cracker, and internal-recycle; and (4) a stabilization and gas-recovery unit (not shown above).

The catalytic cracker has four Houdriflow units. It has improved techniques of pneumatic conveying of catalyst and means for handling mixed-phase oil charge.

Four outstanding control features are largely responsible for its successful operation: catalyst flow control, gamma-ray absorption to determine catalyst level, pneumatic interlock system, and temperature monitoring.—Oil & Gas J, Mar 29, p232



FRENCH AUTOMOBILE PARTS . . .

. . . will be stamped out on this huge 800-ton hydraulic press made for Societe Anonyme des Automobiles Peugeot by Hydraulic Press Mfg. Co. Over-all height of press is 36 ft.; total weight is more than 260 tons. Press has a main ram and two outer rams.—Steel, Mar 19, p47

Rubber Tires Are Better

An increase of nearly 50% in production per unit has followed changing track-mounted loaders to rubber-tired units at Christopher Coal Co. mines. This change permits off-track mining.

The converted machine, a Goodman Mfg. Co. loader, rests on 13 sets of dual wheels. There are 2 sets at the front in fixed alignment outside of the frame. A third set is mounted caster-fashion at the rear. Front tires are 16-ply 10:00 × 15-in.; rear 20-ply 9:00 × 10-in. Drive to the front dual wheels is accomplished by roller chains to sprockets mounted between tires.

All steering is done with the rear, or caster, wheels which are pivoted by hydraulic power. Total length of the machine was not changed from that of the original machine.—Coal Age, Mar, p92

Synthetic Vitamin A Made in Dry Crystalline Form

Newest synthetic vitamin development is commercial production of crystalline vitamin A. It will now be available in a dry form permitting its inclusion in tablets and dry foods. Previously, vitamin A, because of its susceptibility to oxidation, has always been marketed in an oil-stabilized form.

Maker is Chas. Pfizer & Co., which solved the problem by developing a new process to coat dry vitamin crystals with gelatin. Principal starting materials are citral, acetone, formaldehyde, and acetylene. Vitamin A acetate goes into the gelatin-coated powder, although the palmitate ester is also made for liquid products.

Pfizer has big hopes for the new product. As a synthetic substance, it eliminates problems of quality and supply associated with fish-oil concentrates. Also, it is cheaper, easier to package, and needs no refrigeration in storage.

Major advantage over other synthetics, which are in oil solutions, is the solid state. The crystalline vitamin may be used in dry preparations without fear of oxidative deterioration. Food fortification will be an important market.—Chem Ind Wk, Mar 31, p19

Pipe Line May Move Coal

Coal will flow like water through a pipe line when Pittsburgh Consolidation Coal Co. completes its pilot model in Ohio this summer. The line will be 17,000 ft. long and consist of 12-in. pipe. Estimate cost is $550,000.

The coal will be ground to small sizes and mixed with water. The slurry will not run through the pumps on the line because of pump-blade corrosion. Instead, propulsion will come from additional water forced into the line by pumps built alongside the line.—Elec World, Feb 19, p13

Textured Organic Coatings

Appearance of your product goes far toward making it easier or harder to sell. Here are ideas on how to improve that appearance

PROTECTING METALS and furnishing coatings of unusual eye appeal are the double purpose of textured organic coatings. They have some form of variegated surface and are especially useful on industrial products having broad, plain surfaces.

These finishes can also disguise metallic defects. Spot welding and sanding, for example, often leave marks that are difficult to cover with one coat of ordinary paint. But textured finishes can conceal such defects with one coat.

Polychrome Metallic—This finish, often called opalescent or metallic finish, contains aluminum pigment along with the color pigments. Light reflects from aluminum particles and gives a sparkling effect.

Spraying requires no special equipment. Viscosity must be low because too high a spray viscosity produces small "hammers", which detract from appearance. Full wet coat should be applied first, then a mist coat over the wet coat.

Polychrome metallic finishes come in both lacquer and synthetic types. Either can be baked or air-dried. Baking is done for 20–30 min. at 300° F.

Hammer Finishes—Basically the same as polychrome metallic, hammer finishes differ in that the surface appears to possess many small indentations resembling hammer blows.

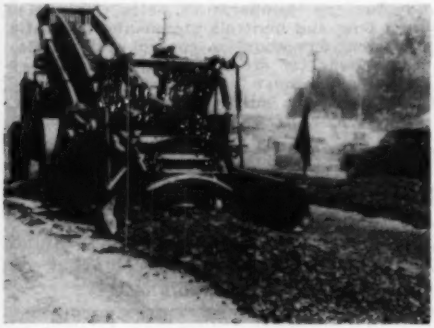
In two-coat hammer, a metallic is "misted" with a fine coat of solvent. Small droplets of solvent falling on the wet coat of metallic produce the hammer effect.

One-coat hammer, which is gaining rapidly in popularity, is sprayed on in one operation. Viscosity and atomization pressure determine pattern size, so both are closely controlled. The pattern can be varied from an effect resembling peen hammer blows to that of a heavy coarse surface.

Two-fluid single-application system pipes two materials to one gun and ejects them in a single spray. As they leave the gun, the heavier material separates from the lighter, spatters on the surface being finished, and forms the hammer pattern. The finish is known as Dimenso (McG-H Digest, Dec '50, p55).

This system offers color effects that cannot be produced by the other methods. The background material may be one color, and the accent another color. Baking schedules are 30 min. at 300° F., 15 min. at 325° F., or their equivalent for infrared heating. Dimenso finish is suitable for furnace jackets, cash registers, fans, and similar items.

Wrinkle Finish—Wrinkle is applied with regular spray equipment. Material



ROAD REJUVENATOR

Machine that gobbles up broken asphalt and processes it into new road-surfacing material has been developed by Shell Oil Co. It pulverizes the old asphalt, mixes it with Shell's new asphalt softener, and lays it down again. Company's claim is a better than new road surface twice as fast and at half the cost.—Oil & Gas J, Mar 22, p62

is varnish with proper additives to give an attractive finish.

Correct film thickness must be applied. Too heavy a coat produces spots with higher gloss than the wrinkle proper. Too light a coat gives a film that does not wrinkle uniformly. A wet film thickness of 4 mils gives best results.

Uses include tool boxes, business machines, appliances, and many more products. A particularly interesting finish, known as pine-tree wrinkle, can be obtained by special treatment.

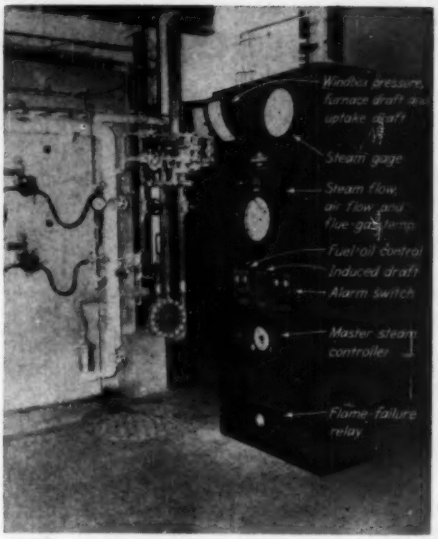
Spatter Finishes—Applying a paint film and then "spattering" a contrasting coat over the first produces spatter finishes. It can be done with two guns or a two-liquid single gun. The first method gives clearly defined spatter spots, while the second produces a blended pattern.

A distinctive spatter finish, known as pebble finish, can be obtained by using two guns and a spatter coat of high viscosity. A special spatter gun is needed to spray the heavier material.

Lacquer Finishes—Crackle lacquers are produced by spraying a hard, quick-drying lacquer over a slower drying flexible lacquer. Both coats are colored. As the top coat dries, it cracks and reveals the undercoat in an intricate pattern of irregular lines. Many color combinations are possible. Lacquer finishes are primarily for novelty finishing.

Webbing lacquers are produced by spraying a rubber-like solution in strings that loop and criss-cross on the surface to form many color patterns. The solvent is highly volatile so the material solidifies as it is sprayed.

Crystal finish is an unusual and beautiful finish obtained by blending lacquers with naphthalene and camphor crystals. As the finish dries, the crystal design grows in size and varies from a small crystal pattern to a long needle-like structure. As film properties are poor, crystal finish should be applied only to products that will receive no excessive abrasion.—Prod Eng, Apr, p 29



ONE-PACKAGE CONTROL PANEL

Boiler control panel at Minnesota Mining & Mfg. Co.'s Wausau plant has everything wrapped in one small package. A quick glance is all that is needed to know what is going on inside the boiler. Boiler meter in center, besides recording steam flow, air flow, and flue-gas temperature, also integrates steam flow and controls steam-air flow ratio in automatic combustion-control system. Recording pens for steam and air should stay together for most economical combustion. Bailey Meter Co. built the control equipment. —Power, Apr, p112

Two New Stainless Steels

Crucible Steel Co. of America has found two new stainless alloy steels that do not use cobalt or columbium.

One of the steels can operate at temperatures between 1300 and 1600° F. The other can withstand temperatures of 1000-1100° F. and contains less than 1% nickel. Another advantage of both steels: they do not require hot or cold working to develop high strength. Normal heat treating does the job.—Business Wk, Mar 3, p76

New York's Bus Terminal Pioneers Electrical Ideas

Electrical design features of New York City's Port Authority Bus Terminal are of extremely advanced design. Here are the high spots:

1. Transitional lighting at bus entrances aids visual adjustment by combining overhead lighting of 50 ft.-c. at entrance and 4 ft.-c. farther in with flood-lighting of columns and other obstructions.

2. Ramps to building are lighted with sodium-vapor luminaires controlled by astronomical time switch. Directional signs on ramps are equipped with cold cathode lighting behind diffusing plastic panels.

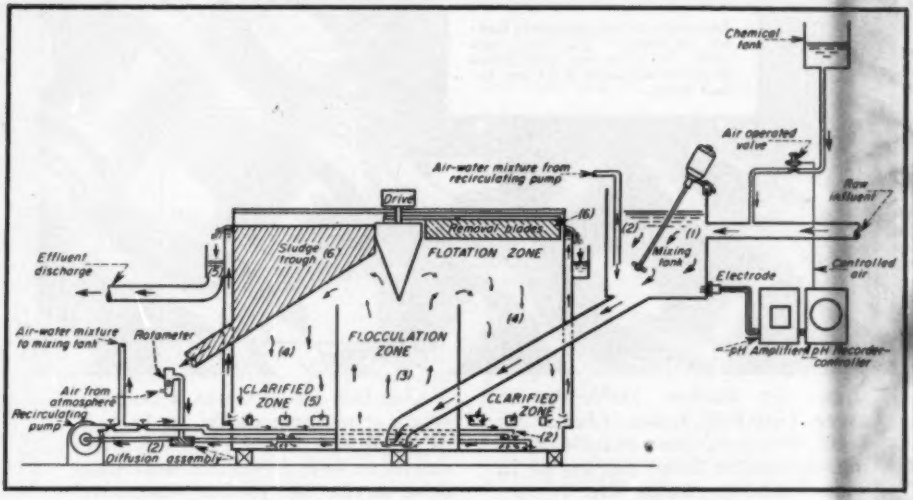
3. Parapet walls around roof parking lot are equipped with recessed lights with plain, diffusing plastic lenses that need no wire guard.

4. Main breakers on switchboards have "one-shot" reclosers with adjustable time delay, for automatic service restoration in case tripping is caused by a feeder fault.—Elec World, Mar 26, p112

Helps Stop Tooth Decay

Treatment of teeth with sodium fluoride has been successful in reducing decay. Now a new chemical, sodium monofluorophospate, has been found to be as effective as fluoride and 85% less toxic.

Phosphate group appears to be the deciding factor in the striking depression of toxicity. Apparently, the compound makes combined fluorine available.—Chem Ind Wk, Mar 31, p27

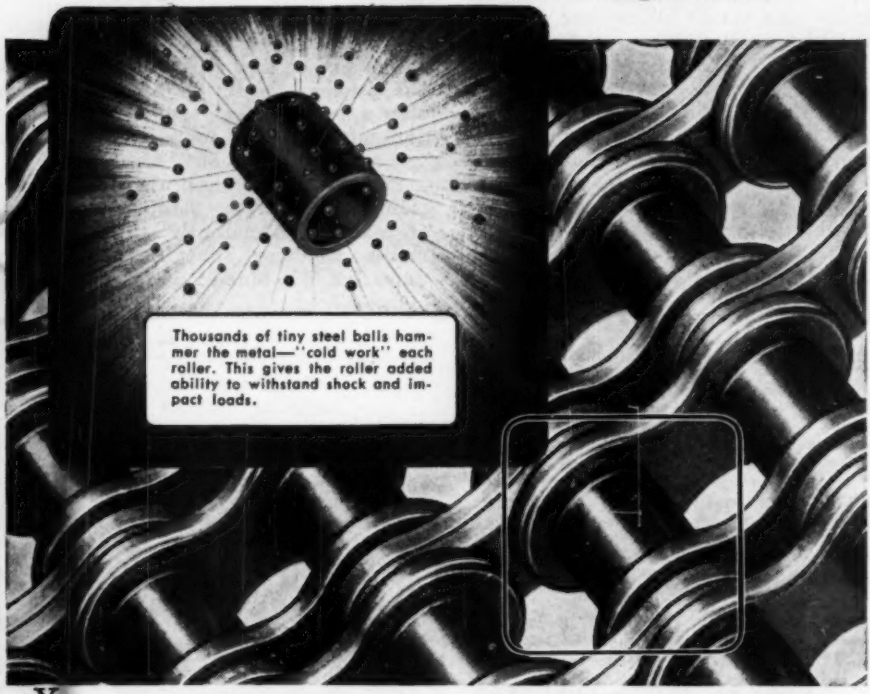


AIR FLOATS PARTICLES FOR WASTE DISPOSAL

Removing suspended solids from plant effluents reduces pollution of streams from industrial wastes. Unit developed by F. S. Gibbs, Inc., does this by flotation with tiny air bubbles (less than 0.001 in. in dia.) attached to solid particles. Bubble attachment is done with "diffusion assembly" placed at inlet of recirculating pump. Process consists of (1) chemical treatment, (2) introduction of bubbles, (3) flocculation, (4) flotation of solids and downflow of clear liquid, (5) clarified liquid overflow, and (6) discharge of floated solids. Unit has proved successful on wastes produced in manufacturing paper (McG-H Digest, Jan, p43), toilet tissue, glue, and soap.—Chem Eng, Apr, p107

RESEARCH AND ENGINEERING BY LINK-BELT SERVES INDUSTRY WORLD-WIDE

How LINK-BELT SHOT-PEENS rollers to give roller chain extra fatigue life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PRODUCTION IDEAS

from Manufacturers' Catalogs

6-1 Protect Your Eyes—Willson Products, Inc. Eye and respiratory selector is a handy device for choosing the right protection from industrial hazards. Set of 8 posters show why it pays to wear safety goggles and are available in English or Spanish. Indicate language desired.

6-2 Small Gasoline Engines—Clinton Machine Co. Specifications for Series C-1100, B-700, VS-300-B, 300-C, and VS-700 engines are covered on separate data sheets. Power range of engines is 0.7-3.0 hp.

6-3 Metalworking Presses—Hydraulic Press Mfg. Co. 12p. Complete descriptions of press operations for deep-drawing, forging, die straightening, coining and shell-nosing are included in bulletin 5005.

6-4 Materials Handling Equipment—Yale & Towne Mfg. Co. 44p. Description and application data on gas and electric fork lift trucks, motorized hand trucks, hand lift trucks, and hand and electric hoists are covered in bulletin P602.

6-5 Aerial Mapping — International Aero Service Corp. 24p. Advantages, methods and applications of aerial mapping are contained in "You Can See More From the Air".

6-6 Industrial Control Devices—Minneapolis-Honeywell Regulator Co. 60p. Catalog 8304 presents non-indicating electric, electronic, and pneumatic control instruments that have many industrial applications.

6-7 Agricultural Sprayers—John Bean Div., Food Machinery & Chemical Corp. 60p. Booklet L-830-25M-W51 describes automatic spraying equipment needed to protect crops from insects and pests.

6-8 Shovel and Dragline Parts—American Brake Shoe Co. 40p. Manganese steel parts for digging and loading machinery are described in bulletin 547-DS.

6-9 Port Facilities at Charleston—South Carolina State Ports Authority. 29p. Brochure "Cargoes Through Charleston" presents the facilities and advantages of routing cargo through port of Charleston.

6-10 Welding Engineering—Eutectic Welding Alloys Corp. 44p. National Defense Series, No. 1 booklet contains engineering and design data for fabricating metals with low temperature welding alloys.

6-11 Specialized Lubricants—Fiske Brothers Refining Co. 54p. Lubrication information on various equipment and processes is given in Data Book 1-50.

6-12 Rust Preventive — Rust-Oleum Corp. 16p. Catalog 249 lists various coatings, finishes and sealers for preventing rust. Color chips are included.

6-13 Track Equipment—West Virginia Steel & Mfg. Co. 160p. Full line of track equipment and accessories necessary to build and maintain railroad tracks is covered in Catalog D.

6-14 Multiple Electrode Welding—Linde Air Products Co. 28p. Discussion of welding techniques with multiple electrodes in series is contained in pamphlet P-27818, F-7693.

6-15 Electric Windshield Wipers—American Bosch Corp. 28p. Electric windshield wipers for passenger cars, trucks, busses and boats are described in catalog 3504LKM950.

6-16 Scientific Management — Work-factor Co. 16p. Pamphlet "Beat Your Competition thru Work-factor" tells how a scientific management service can help increase production and sales and cut costs.

6-17 Power Operated Valves—Rockwell Mfg. Co. 40p. Data covering the use of pneumatic, hydraulic, and electric operators for lubricated plug valves is compiled in bulletin V-214.

6-18 Engineering Data for Blowers—Moore Co. 78p. Catalog 5001 presents data for design and installation of various types of fans and blowers.

6-19 Induction Heating—Ohio Crankshaft Co., Tocco Div. 60p. Induction heating principles, applications and equipment are given in catalog 22.

6-20 Controlled Air Power—Bellows Co. 24p. Bulletin CL-30 describes control devices for compressed air operated vises, fixtures, and feeders.

6-21 Fight Waste—Henry Disston & Sons, Inc. 72p. "Disston Pocket Foreman" contains description of Fight Waste Cards. Each card lists typical tools' troubles and failures, their causes and how to correct them.

PRODUCTION IDEAS (Cont.)

6-22 Packaged Generators — Electrical Machinery Mfg. Co. 16p. A-c. generators with built-in voltage regulators and 3-150 kw. ratings are covered in pamphlet 2100-PRD-202.

6-23 Stainless Steels—Armco Steel Corp. 16p. Booklet 950-NA describes properties of two precipitation hardening stainless steels.

6-24 Automotive Parts — Weatherhead Co. 52p. Tube fittings, cocks, hose, fuel lines, brake fittings and dash controls for automobiles are listed in catalog J-103-L.

6-25 Flame Hardening Apparatus — Airco Company International 20p. Descriptions and illustrations of the latest flame hardening equipment is contained in catalog 4.

6-26 Hosiery Machines—Karl Lieberknecht, Inc. 20p. "Full Fashioned Knitting Machines" describes features and functions of hosiery knitting machines. Catalog is printed in English, French, German, Spanish and Italian.

6-27 Hydraulic Pumps—Vickers Inc. 16p. Specifications, charts and design details are given in catalog M-5100 for oil hydraulic power jacks, pumps, steering boosters and motors used on mobile equipment.

6-28 Port Facilities—Delaware River Joint Commission. 32p. Facilities for handling ocean shipping at Delaware River Ports are described in "Shortcut to World Markets".

6-29 Building Materials—Johns-Manville International Corp. 22p. Three folders, AC-34A, IB-30A, and FL-37A, describe noise absorbing units, insulating board, and plastic asbestos floor tile respectively.

6-30 Soot Blowing Systems — Continental Foundry & Machine Co. 16p. Automatic power operated soot blowers for modern high-pressure boilers are covered thoroughly in brochure 483.

6-31 Variable Speed Motors—U. S. Electrical Motors Inc. 16p. Brochure 1515 describes electric motors that can be adjusted to give any required speed over a wide range while operating.

6-32 Diamond Tools — Precision Diamond Tool Co. 16p. Catalog 50 describes diamond dressers used on all popular grinders.

6-33 Treats Raw Water—Dorr Co. 32p. Bulletin 9041 describes a unit designed for softening, color or turbidity removal from municipal or industrial water supplies.

6-34 Emulsifiers and Spreading Agents—Atlas Powder Co. 24p. Data on surface active agents for formulating insecticides and herbicides is given in CD-58-7M-11-50.

6-35 Colors for Paint—American Cyanamid Co., Calco Chemical Div. 28p. Booklet, "Colors", presents listings of colored and white pigments and dyes for formulating and manufacturing paints, lacquers and enamels.

6-36 Vacuum Tube Substitutions—Sylvania Electric Products Inc. 40p. Information for substitutions of critical radio and television tubes is contained in "Tube Substitution Manual".

6-37 Infra-Red Cuts Costs — Fostoria Pressed Steel Corp. 20p. Industrial heating applications with infra-red lamps are contained in bulletin EV-M-149-10.

COPIES of these manufacturers' catalogs will be sent free to subscribers. Fill in squares with catalog numbers desired and mail to the Editor, McGraw-Hill Digest, 330 W. 42nd St., New York 18, N. Y., U. S. A.

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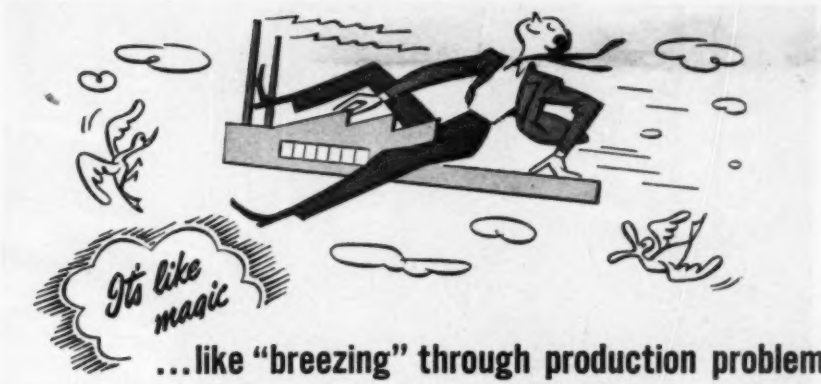

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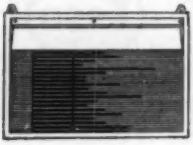

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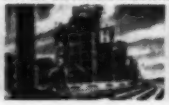

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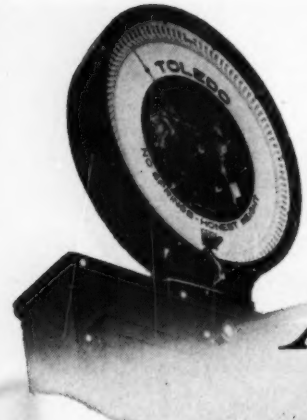

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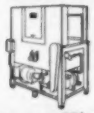

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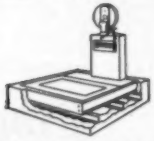

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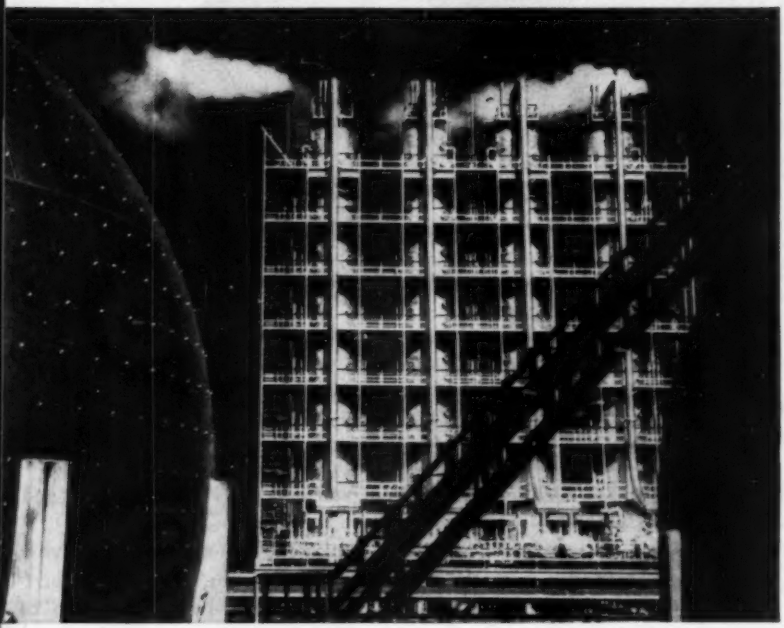

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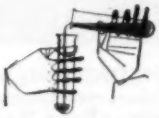

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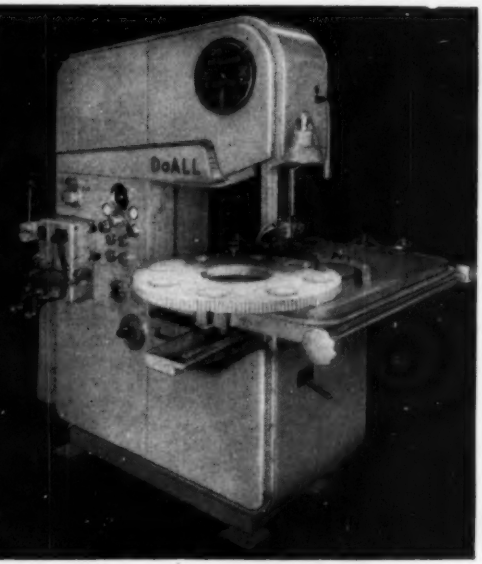

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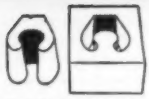

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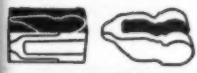

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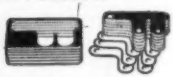

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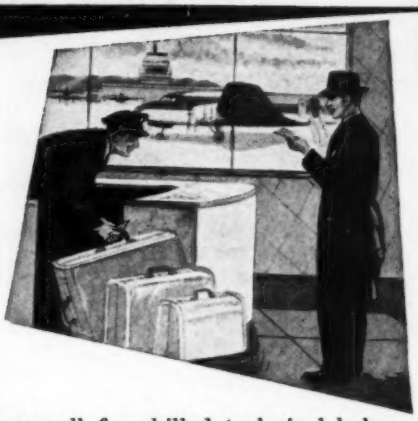

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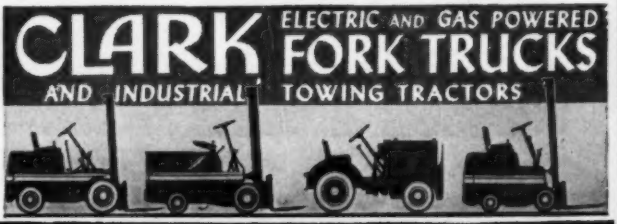

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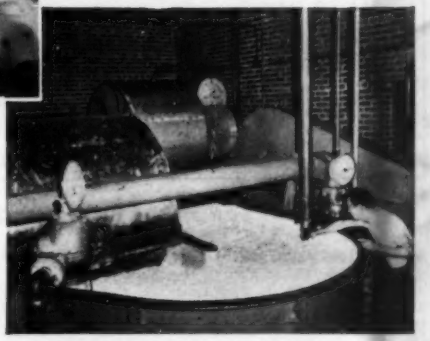

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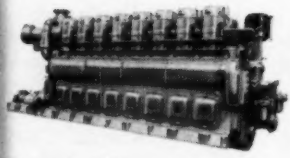

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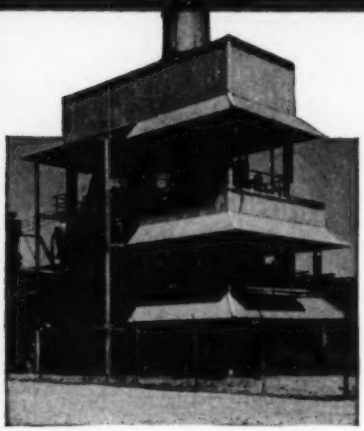

Fifty-ton Soybean Oil Extraction Plant designed and erected by Blaw-Knox

INDUSTRIAL EQUIPMENT

ROLLING MILL EQUIPMENT
ROLLS FOR ROLLING MILLS
COMPLETE PROCESS PLANTS
PROCESS EQUIPMENT
OPEN STEEL FLOORING
INDUSTRIAL BUILDINGS

CONSTRUCTION EQUIPMENT

BATCHING PLANTS
CLAMSHELL BUCKETS
SUBGRADER, SPREADER, FINISHER
TRUKMIXERS
ADNUN BLACK TOP PAVER
MULTI-FOOTE CONCRETE PAVERS

Blaw-Knox engineering thinking and engineered products play important parts in world-wide industrial development. They fit into the picture wherever there is a chemical or processing plant to be planned or built, a highway or airfield to be constructed, ferrous or non-ferrous metal to be rolled and fabricated . . . wherever there is need for power and radio transmission. Blaw-Knox has the engineering brains, the manufacturing facilities and the organization to aid in getting plants into operation quickly, save man-power, increase production and reduce costs. Make this aid available to you by addressing Blaw-Knox Export Department.

BLAW-KNOX COMPANY

PITTSBURGH, PENNSYLVANIA, U.S.A.

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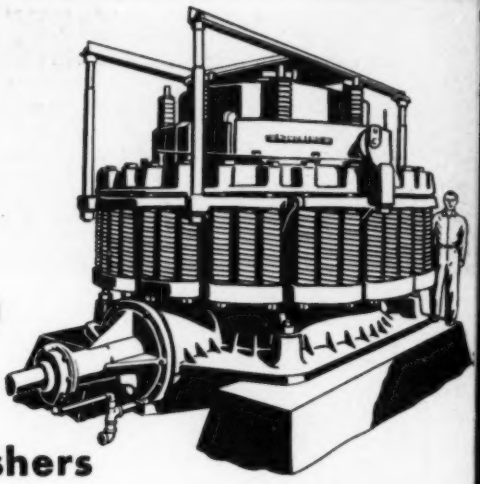
There are MORE *Symons Cone Crushers* in use for fine reduction crushing than all competitive makes of gyratory reduction crushers

COMBINED!



Here are some of the reasons why:

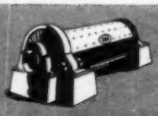
1. UNIFORM CONTROLLED FEED
2. MAXIMUM LINER UTILIZATION
3. GREATER OUTPUT AT LOWER COST
4. AUTOMATIC PROTECTION FROM TRAMP IRON

. . . these are just four of the many Symons Cone features that make possible the enormous output of fine product which has won for Nordberg the position of world leadership in the fine crushing field. Write for detailed information on a size and type to meet your needs.

Other NORDBERG PRODUCTS

RAILWAY MAINTENANCE MACHINERY

GASOLINE MARINE ENGINES



PROCESSING MACHINERY

MINE HOISTS

DIESEL ENGINES

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